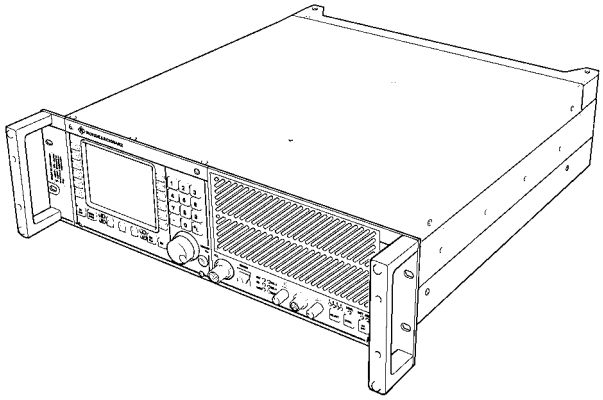
ROHDE&SCHWARZ

Radio Communication Systems
Division

Operator's Manual



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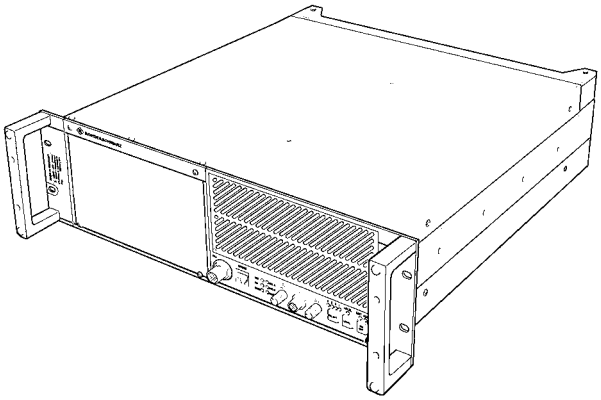

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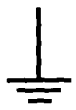
Safety Instructions

This unit has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards.

To maintain this condition and to ensure safe operation, the user must observe all instructions and warnings given in this operating manual.

Safety-related symbols used on equipment and documentation from R&S:

							
Observe operating instructions	Weight indication for units >18 kg	PE terminal	Ground terminal	Danger! Shock hazard	Warning! Hot surfaces	Ground	Attention! Electrostatic sensitive devices require special care

1. The unit may be used only in the operating conditions and positions specified by the manufacturer. Unless otherwise agreed, the following applies to R&S products:

   IP degree of protection 2X, pollution severity 2 overvoltage category 2, only for indoor use, altitude max. 2000 m.

   The unit may be operated only from supply networks fused with max. 16 A.

   Unless specified otherwise in the data sheet, a tolerance of ±10% shall apply to the nominal voltage and of ±5% to the nominal frequency.

2. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures should be taken to avoid any hazards.

   (using, for example, appropriate measuring equipment, fusing, current limiting, electrical separation, insulation).

3. If the unit is to be permanently wired, the PE terminal of the unit must first be connected to the PE conductor on site before any other connections are made. Installation and cabling of the unit to be performed only by qualified technical personnel.

4. For permanently installed units without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused such as to provide suitable protection for the users and equipment.

5. Prior to switching on the unit, it must be ensured that the nominal voltage set on the unit matches the nominal voltage of the AC supply network.

   If a different voltage is to be set, the power fuse of the unit may have to be changed accordingly.

6. Units of protection class I with disconnectible AC supply cable and appliance connector may be operated only from a power socket with earthing contact and with the PE conductor connected.

7. It is not permissible to interrupt the PE conductor intentionally, neither in the incoming cable nor on the unit itself as this may cause the unit to become electrically hazardous.

   Any extension lines or multiple socket outlets used must be checked for compliance with relevant safety standards at regular intervals.

8. If the unit has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply.

   If units without power switches are integrated in racks or systems, a disconnecting device must be provided at system level.

9. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

   Prior to performing any work on the unit or opening the unit, the latter must be disconnected from the supply network.

   Any adjustments, replacements of parts, maintenance or repair may be carried out only by authorized R&S technical personnel.

   Only original parts may be used for replacing parts relevant to safety (eg power switches, power transformers, fuses). A safety test must be performed after each replacement of parts relevant to safety.

   (visual inspection, PE conductor test, insulation-resistance, leakage-current measurement, functional test).

continued overleaf

Safety Instructions

10. Ensure that the connections with information technology equipment comply with IEC950 / EN60950.
11. Lithium batteries must not be exposed to high temperatures or fire.

    Keep batteries away from children.

    If the battery is replaced improperly, there is danger of explosion. Only replace the battery by R&S type (see spare part list).

    Lithium batteries are suitable for environmentally-friendly disposal or specialized recycling. Dispose them into appropriate containers, only.

    Do not short-circuit the battery.
12. Equipment returned or sent in for repair must be packed in the original packing or in packing with electrostatic and mechanical protection.
13. Electrostatics via the connectors may damage the equipment. For the safe handling and operation of the equipment, appropriate measures against electrostatics should be implemented.
14. The outside of the instrument is suitably cleaned using a soft, lint-free dustcloth. Never use solvents such as thinners, acetone and similar things, as they may damage the front panel labeling or plastic parts.
15. Any additional safety instructions given in this manual are also to be observed.

CE 0682 !

Für Betrieb im Europäischen Wirtschaftsraum (EWR) und zivilen Einsatz. Hinweis gemäß dem Gesetz über „Funkanlagen und Telekommunikations-endeinrichtungen“ (FTEG) und der Europäischen Richtlinie 1999/5/EG:

Dieses Produkt darf innerhalb des EWR nicht uneingeschränkt betrieben werden, da der verwendete Frequenzbereich auf nicht harmonisierten Bändern erfolgt. Nationale Vorschriften / Genehmigungen sind zu beachten.
Das Gerät ist 4 Wochen vor Inverkehrbringen bei der jeweils zuständigen nationalen Behörde für die Frequenzhoheit zu notifizieren. Informationen hierzu im Internet unter folgender Adresse: http://europa.eu.int/comm/enterprise/rtte/spectr.htm

For operation in the European Economic Area (EEA) and for civil use. Note pursuant to the German Radio and Telecommunications Terminal Equipment Directive (FTEG) and the European R&TTE Directive 1999/5/EC:

Operation of this product within the EEA is subject to restrictions since the frequency bands used are not harmonized. National provisions / authorizations shall be complied with.
The product shall be notified to the competent national frequency management authority four weeks before the product is put on the market.
For more information refer to: http://europa.eu.int/comm/enterprise/rtte/spectr.htm

ROHDE&SCHWARZ

KONFORMITÄTSERKLÄRUNG gemäß dem Gesetz über Funkanlagen und Telekommunikationsendeinrichtungen (FTEG) und der Richtlinie 1999/5/EG (R&TTE)
DECLARATION OF CONFORMITY in accordance with the Radio and Telecommunications Terminal Equipment Act (FTEG) and Directive 1999/5/EC (R&TTE Directive)

CE

Zertifikat-Nr.: / Certificate No.: 2003-19

Hiermit wird bescheinigt, dass die Funkanlage
This is to certify that the radio equipment

Gerätetyp / Equipment Type	Materialnummer / Stock No.	Benennung / Designation
XT4410A	**6102.0307.xx**	**VHF/UHF Transceiver**
XT4460A	**6102.1103.xx**	**VHF/UHF Transceiver**
XD4410A	**6122.1109.xx**	**UHF Transceiver**

Geräteklasse: / Equipment class: 2.12 – Infrastructure equipment

bei bestimmungsgemäßer Verwendung den grundlegenden Anforderungen des § 3 und den übrigen einschlägigen Bestimmungen des FTEG (Artikel 3 der R&TTE) entspricht.
complies with the essential requirements of §3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive), when used for its intended purpose.

- Gesundheit und Sicherheit gemäß § 3 (1) 1 (Artikel 3 (1) a))
- Health and safety requirements pursuant to § 3 (1) 1 (Article 3(1) a))

- Schutzanforderungen in Bezug auf die elektromagn. Verträglichkeit § 3 (1) 2, Artikel 3 (1) b))
- Protection requirements concerning electromagnetic compatibility § 3(1)(2), (Article 3(1)(b))

- Maßnahmen zur effizienten Nutzung des Funkfrequenzspektrums
- Measures for the efficient use of the radio frequency spectrum

- Luftschnittstelle bei Funkanlagen gemäß § 3(2) (Artikel 3(2))
- Air interface of the radio systems pursuant to § 3(2) (Article 3(2))

Angewendete harmonisierte Normen:
Harmonized standards applied:
EN 60950:1992+A1:1993+A2:1993+A3:1995+A4:1997
EN 300339 V1.1.1 (1998-06)

Einhaltung der grundlegenden Anforderungen auf andere Art und Weise (hierzu verwendete Standards/Spezifikationen):
Other means of proving conformity with the essential requirements (standards/specifications used):
ETSI EN 301489-1 V1.3.1 (2001-09)
ETSI EN 301489-22 V1.1.1 (2000-12)
EN 300676 V1.2.1 (2000-05)
RegTP 321 ZV 39

Anbringung des CE-Zeichens ab: 2003 / Affixing the EC conformity mark as from 2003

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München, den 26.05.2003
Munich, 2003-05-26

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If you have any questions on Radio Communication System products, our support center staff will provide any assistance possible.

Hotline services are available: Monday through Friday from 08:00 to 17:00 (GMT + 1).

Additionally you may also contact us round the clock via e-mail at the address stated above.

Note

This manual deals with the following Software Packages and M3SR Transceivers:

Software Package	DS 4410A	6102.2068.05	fullband, with Link 11
Software Package	DS 4410A	6102.2051.04	fullband
Software Package	DS 4410A	6102.2097.03	with Link 11
Software Package	DS 4410A	6102.2080.03	
UHF Transceiver	XD 4410A	6122.1109.03	with integrated Control Unit GB 4000C
UHF Transceiver	XD 4410A	6122.1109.13	with Link 11, and integrated Control Unit GB 4000C
UHF Transceiver	XD 4410A	6122.1109.15	with Antenna Interface GI 4403, mod. 02 and integrated Control Unit GB 4000C
UHF Transceiver	XD 4410A	6122.1109.31	with Guard Receiver ET 4400G and integrated Control Unit GB 4000C
VHF / UHF Transceiver	XT 4410A	6102.0307.03	with integrated Control Unit GB 4000C
VHF / UHF Transceiver	XT 4410A	6102.0307.13	with Link 11, and integrated Control Unit GB 4000C
VHF / UHF Transceiver	XT 4410A	6102.0307.22	with UHF Filter FD 4430 and integrated Control Unit GB 4000C
VHF / UHF Transceiver	XT 4410A	6102.0307.31	with Guard Receiver ET 4400G and integrated Control Unit GB 4000C
VHF / UHF Transceiver	XT 4410A	6102.0307.41	with Link 11, Guard Receiver ET 4400G and integrated Control Unit GB 4000C
VHF / UHF Transceiver	XT 4410A	6102.0307.42	with UHF Filter FD 4430, Guard Receiver ET 4400G, and integrated Control Unit GB 4000C
VHF / UHF Transceiver	XT 4460A	6102.1103.02	without OCXO
VHF / UHF Transceiver	XT 4460A	6102.1103.03	
VHF / UHF Transceiver	XT 4460A	6102.1103.13	with Link 11
VHF / UHF Transceiver	XT 4460A	6102.1103.31	with Guard Receiver ET 4400G
VHF / UHF Transceiver	XT 4460A	6102.1103.41	with Link 11 and Guard Receiver ET 4400G

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E V A L U A T I O N O F M A N U A L S

here: **Operator's Manual, Id. No. 6076.0822.12.02, M3SR Transceiver X. 4410A / X. 4460A**

Dear Sirs,

we constantly try to improve our technical manuals, so that you, our customer gets the best possible benefit from them.

In order to become better, we need your help and your opinion on the manuals. Therefore, we would like you to evaluate the accompanying manual and tell us your opinion about it. In order to make the job easy for you, we have designed the following matrix. Please tick where appropriate.

1. What is your general impression of the manual?

❑	❑	❑	❑	❑
lousy	not so good	quite ok	good	excellent

2. How do you assess the detail and depth of information in general?

❑	❑	❑	❑	❑
far too detailed	too much information	all information contained	not enough information	important items missing

3. How do you assess the size of the manual in general?

❑	❑	❑	❑	❑
far too bulky	a bit too thick	appropriate to the equipment	easy to handle	very clearly presented

4. How do you assess the structure of the manual?

❑	❑	❑	❑	❑
opaque	difficult to understand	quite ok	easy to find information	very user-friendly

5. How do you assess the understandability (language) of manual?

❑	❑	❑	❑	❑
very difficult to follow	complicated language	normal to understand	easy to understand	very user-friendly

EVALUATION OF MANUALS

Operator's Manual, Id. No. 6076.0822.12.02, M3SR Transceiver X. 4410A / X. 4460A

6. How do you rate the number of illustrations?

❑	❑	❑	❑	❑
far too many	a bit too many	just about right	could be more	not enough illustrations

7. How do you rate the quality of illustrations?

❑	❑	❑	❑	❑
lousy	not so good	quite ok	good	excellent

8. How do you assess the balance of text to illustrations?

❑	❑	❑	❑	❑
lousy	not so good	quite ok	good	excellent

Further Comments and Suggestions for Improvement:

Date / Signature / Department

First Edition and Revisions

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First revision.....Change Index 02.....August 2003

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List of Abbreviations

AC	alternating current
ACC	according
ADC	analog-to-digital converter
ADDR	address
ADVCD	advanced
AF	audio frequency
AFI	audio frequency interface
AFP	audio frequency panel
AFU	audio frequency unit
AGC	automatic gain control (IF level)
ALC	automatic level control
AM / A3E	amplitude modulation
AMP	amplifier
ASK	amplitude shift keying
ATC	air traffic control
ATEC	active time error correction
ATT	attenuator
AUDFIL	audio filter
BATT	battery
BB	baseband
BER	bit error rate
BI	break-in
BIT	built-in test
BITE	built-in test equipment
BNC	(RF connector type)
BP	bandpass filter
BW	bandwidth
C	control unit
CAL	calibrate
CARR	carrier
CBIT	continuous built-in test
CCU	comfort control unit
CD	carrier detection
CGC	cipher ground control
CH, CHAN	channel
CHAR	character
CL	communication line
CLEW	conventional Link Eleven waveform
CLIP	clipper
CLK	clock
CLR	clear
CSMA	carrier-sense multiple access
CODEC	coder-decoder equipment
COMLINE	communication line
COMM	communication mode
COMP	component
COMP	complete
COMSEC	communication security
CONFER	conference
CONTR	contrast
COR	crypto override
CP	cipher
CP	control panel
CP	current page
CPH	cipher
CSEC	communication security
CT	cipher text
CTRL	control
CTS	clear to send
CU	control unit
CUR	current
CVSD	continuously variable slope delta modulation
D	data
D	digital
DAC	digital-to-analog converter
dB	decibel
DC	direct current
DCD	data carrier detect
DEF	definition
DEV	device
DEV	deviation
DIN	Deutsche Industrienorm (German Industrial Standard)
DISP	display
DP	diphase
DPR	dual-port RAM
DPTT	delayed PTT
DSP	digital signal processor
DTMF	dual-tone multiple frequency
ECCM	electronic counter counter measures
EC	European Community (standard)
EEPROM	electrical erasable programmable read-only memory
EMC	electromagnetic compatibility
EMCL	emergency clear
ENT	enter
EOM	end of message
EPM	electronic protection measures
ERR	error
ESC	escape
ETSI	European Telecommunictions Standard Institute
EXT	external
FF	fixed frequency
FIL	filter
FM / F3E	frequency modulation
FMC	frequency management center
FMT	frequency management training
FP	front panel
FPGA	field-programmable gate array
FREQ, FRQ	frequency
FSK	frequency shift keying
FW	firmware
G	guard receiver
G	gateway
GND	ground
GMT	Greenwich mean time (see UTC)
GR, GRx	guard receiver
HAIL	hailing
HD	half duplex
HQ	Have Quick

HW	hardware
HWM	hardware module
IBIT	initiated built-in test
ICAO	International Civil Aviation Organization
ID	identification
IDD	interface design document
IEC	International Electrotechnical Committee
IETF	Internet engineering task force
IF	intermediate frequency
IF	interface
ILLUM	illumination
IMP	impedance
IN	input
INV	inventory
I/O	input/output
IP	Internet protocol
IrDA	Infrared Data Association, here also: infrared data access
ISDN	integrated services digital network
ITU	International Telecommunic-tions Union (ITU standards)
KDD	key distribution device
KED	key entry device
KEYBD	keyboard
KFMC	key and frequency management center
KMC	key management center
L	local
LAN	local area network
LCA	logic cell array (SW-program-mable gate array)
LD	low distortion
LED	light-emitting diode
LEV	level
LN	low noise
LO	local oscillator
LOC	local
LOG	logical
LOS	line of sight
LP	lowpass filter
LRU	line-replaceable unit
LSB	least significant bit
LW	low
M	main receiver
M3SR	multiband, multimode and multirole surface radio
MAINT	maintenance
MED	medium
MHS	management and handling system
MHz	megahertz
MISC	miscellaneous
MMC	mission management center
MMI	man-machine interface
MOD	module
MOD, MODU	modulation
MONIT	monitor
MRK	marker
MSB	most significant bit
MTBF	mean time between failures
MTTR	mean time to repair
N	newton
NATO	North Atlantic Treaty Organization
NB	narrowband
NE	net entry
NO	number
O	operational
OCXO	oven-controlled crystal oscillator
OFFS	offset
OMC	operation management center
PA	power amplifier
PARAMS	parameters
PBIT	power-on built-in test
PCB	printed circuit board
PIN	personal identification number
PLL	phase-locked loop
PM	phase modulation
POR	plain override
POW	power
PP	preset page
PPM	parts per million
PPM	pulse per minute
PPS	pulse per second
PREV	previous
PROD	production
PROT	protection
PS	power supply
PT	plain text
PTT	push to talk
PWR	power
R	radio
RAM	random access memory
RC	remote control
RCB	radio control bus
RDB	radio data bus
REC	receive
REF	reference
REM	remote
RF	radio frequency
RFC	request for commands
RI	ring indicator
RMB	radio module bus
RSSI	received signal strength indicator
RTS	ready to send
RX	receiver, reception
RxD	receive data
S/N	signal-to-noise ratio
SATURN	Second Generation Anti-jam Tactical UHF Radio for NATO
SER	serial
SIDETN	sidetone
SL	slot
SNO	serial number
SOC	software options controller
SP	spacing
SQ, SQL	squelch
SQUG	squelch guard receiver

SQUM	squelch main receiver
SRC	source
ST, STAT	status
STTE	special-to-type test equipment
SUP	supply
SW	software
SYNC	synchronization
SYNT	synthesizer
SW	software
SWM	software module
T	training
T	type
TBD	to be defined
TBRL	to be released later
TCXO	temperature-compensated crystal oscillator
TDMA	time division multiple access
TFOM	time figure of merit
TFT	thin-film transistor
THD	total harmonic distortion
TOD	time of day
TRANSEC	transmission security
TX	transmitter, transmission
TxD	transmit data
U/V	UHF / VHF
UHF	ultra high frequency
UNCP	unciphered
UTC	universal time coordinated
V	voice
V	voltage
VAC	volt alternating current
VCXO	voltage-controlled oscillator
VDC	volt direct current
VDE	Verein Deutscher Elektrotechniker (German Standard)
VER	version
VHF	very high frequency
VOLT	voltage
V_{OP}	operating voltage
V_{PP}	peak-to-peak voltage
V_S	switched voltage
VSWR	voltage-standing wave ratio
W	watt
WB	wideband
WOD	word of day

Definitions

Check	In appropriate measurements by means of the specified test equipment proper functioning of a unit or module is established.
Discolouration	Components such as e.g. connectors and printed circuit boards are examined if they have changed colour due to temperature effects and thus differ widely from their normal condition.
Disconnect	Pull off connector.
Examine	In case of trouble the unit / module or components such as e.g. connectors, are to be thoroughly checked for obvious mechanical damage.
Functional check	This means that components / modules / units are checked for proper functioning while installed.
Hazardous voltages	Voltages > 30 V_{rms} or 50 V_{pp} (AC) or 50 V (DC)
Make sure	Ascertain whether all mentioned requirements are met or all measures are taken to establish the required condition.
Open	Access is to be gained to the unit / module by observing the given instructions and safety precautions.
Perfect condition	This means that a component / module / unit has to be in a state which does not give cause to complaints.
Replacement	In case of trouble the replacement of modules is carried out in order to localize and eliminate the fault.
Replace	Components / modules / units which - due to damage and / or other defects - no longer meet the respective requirements or components / modules / units which during troubleshooting were identified as the cause of fault, are to be replaced.

Visual examination	This is a visual inspection of the outer appearance and completeness of a component / module / unit without manual interference by the examiner. This does not include the necessary preparations and finishing work such as e.g. opening and closing of covers or similar.

Notices

The three different notices used in this Operator's Manual have the following meaning:

W A R N I N G

This heading is used to indicate that inaccurate observance or nonobservance of instructions or methods can cause injury or even fatal accidents or during an operation described hazardous material can be set free in the unit or system.

C A U T I O N

This heading is used to indicate that inaccurate observance or nonobservance of instructions or methods can cause damage to the unit.

Note:

This heading is used to draw the reader's attention to a particular fact.

This manual contains the following 'Warning':

W A R N I N G

Wear goggles when working with compressed air in order to avoid eye injuries.

User Information

Purpose of the Manual

This Manual provides all information the operators and service staff need to maintain level 1 of repairs.

lt contains all necessary information and instructions concerning the installation, putting into operation and control of the unit, plus troubleshooting instructions down to unit level. In case of trouble this allows straightforward error localization as well as easy replacement of the unit.

We recommend to keep complete spare units in store.

Measuring Units

In this Manual the basic SI measuring units and units coherently derived from them are used by preference. In exceptional cases units legally derived from the SI units acc. to DIN1301 may also be used.

Symbols

The different symbols used in this Manual have the following meaning:

❑ = emphasizing / setting off general facts

• = special remark

☞ = single action

➢ = setting off general facts

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Chapter

M3SR TRANSCEIVERS • X. 4410A / X. 4460A

Operator's Manual

List of Contents

List of Figures

1. User Information

This manual deals with the following M3SR Transceivers:

- ❑ VHF Transceivers XU 4410A and XU 4460A
- ❑ UHF Transceivers XD 4410A and XD 4460A
- ❑ VHF / UHF Transceivers XT 4410A and XT 4460A

The only difference between the four transceivers is the frequency range (X. means XD = UHF, XT = VHF/UHF, XU = VHF) and that M3SR Transceiver X. 4410A has a Control Unit GB 4000C, mod. 02 installed at the front instead of the dummy panel of X. 4460A. Therefore, here reference is made mostly to the "Transceiver" in general, differences being pointed out, where necessary.

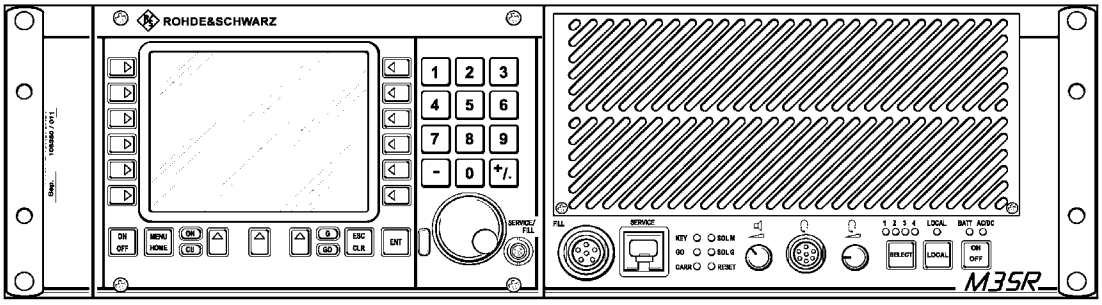
1.1 General Features

M3SR (= Multiband, Multimode and Multirole Surface Radio) is a completely new, economic, highly flexible and future-oriented radio generation for military or non-military applications. It is designed as an advanced, reliable and dynamic communications platform to meet the joint tactical radio objectives, and meet the interoperability requirements for stationary, mobile, shipboard and even special airborne communications scenarios.

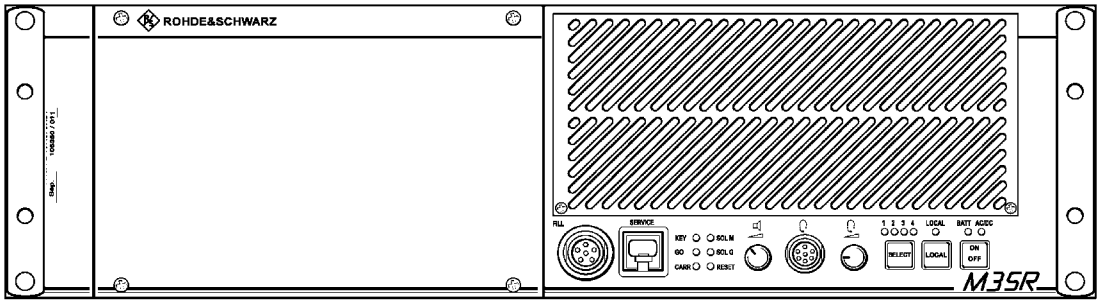
The high-performance digital M3SR Transceiver can be used for transmission and reception in the VHF and / or UHF band (in the range from 100 to 512 MHz).

The radios are capable of transmitting and/or receiving analog voice, digital voice and data in all commonly used classes of emission, i.e. AM and FM in either narrowband or wideband configurations.

M3SR Transceivers X. 4410A and X. 4460A operate in fixed frequency mode.



X. 4410A



X. 4460A

Fig. 1.1 M3SR Transceiver X. 4410A / X. 4460A, Front View

General benefits of the M3SR Transceiver are:

- ❑ **Open-systems architecture** to customize for individual initial or future needs.
- ❑ **Digital software programming** of multiband, multifunction and multimode technology platform for advanced data waveforms, allowing flexible use and fast upgrading.
- ❑ **High modularity ("sliced radio")** with a variety of internal modules and rear interfaces to meet the customer's operational and system requirements.
- ❑ **Versatile man-machine interface** due to various local control panels and remote control units.
- ❑ **Simple data handling in networks** due to compatibility with standard bus systems (RS 485, LAN).
- ❑ **High reliability** (MTBF), **short MTTR** and efficient testability together with optimum maintainability.

1.2 Explanation of Models

Each of the transceiver types is available in different models, which are distinguished as follows. "xx" in the identification number stands for the model designator.

XT 4410A (ident. no. 6102.0307.xx):

	Model					
Option	03	13	22	31	41	42
LINK 11 (CLEW) SW package		x			x	
Guard Receiver ET 4400G				x	x	x
UHF Filter FD 4430			x			x

XT 4460A (ident. no. 6102.1103.xx)

	Model				
Option	02	03	13	31	41
OCXO		x	x	x	x
LINK 11 (CLEW) SW package			x		x
Guard Receiver ET 4400G				x	x

XD 4410A (ident. no. 6122.1109.xx)

	Model			
Option	03	13	15	31
LINK 11 (CLEW) SW package		x	x	
Guard Receiver ET 4400G				x
Antenna Interface GI 4403, mod. 02			x	

1.3 Required Personnel

Configuration of the M3SR Transceiver will have to be done by qualified personnel. Installation and operation of the transceiver should be assigned to adequately skilled personnel.

The personnel must be familiar with this Operator's Manual.

1.4 Required Power Supply

The M3SR Transceiver operates on a DC voltage of 28 VDC (19 to 31 VDC). This voltage is provided by the external AC Power Supply IN 4000A (19" rackmount of 1 height unit) available for the purpose. The connecting cable between transceiver and AC Power Supply IN 4000A is available on demand.

The transceiver may also be powered by an external battery (22 to 31 VDC). An automatic switchover facility integrated in the transceiver provides for automatic standby switchover in case primary power fails.

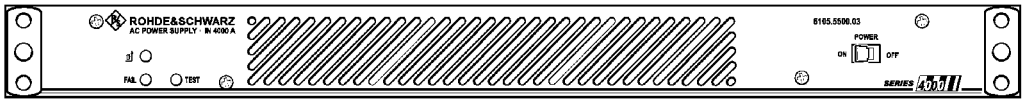


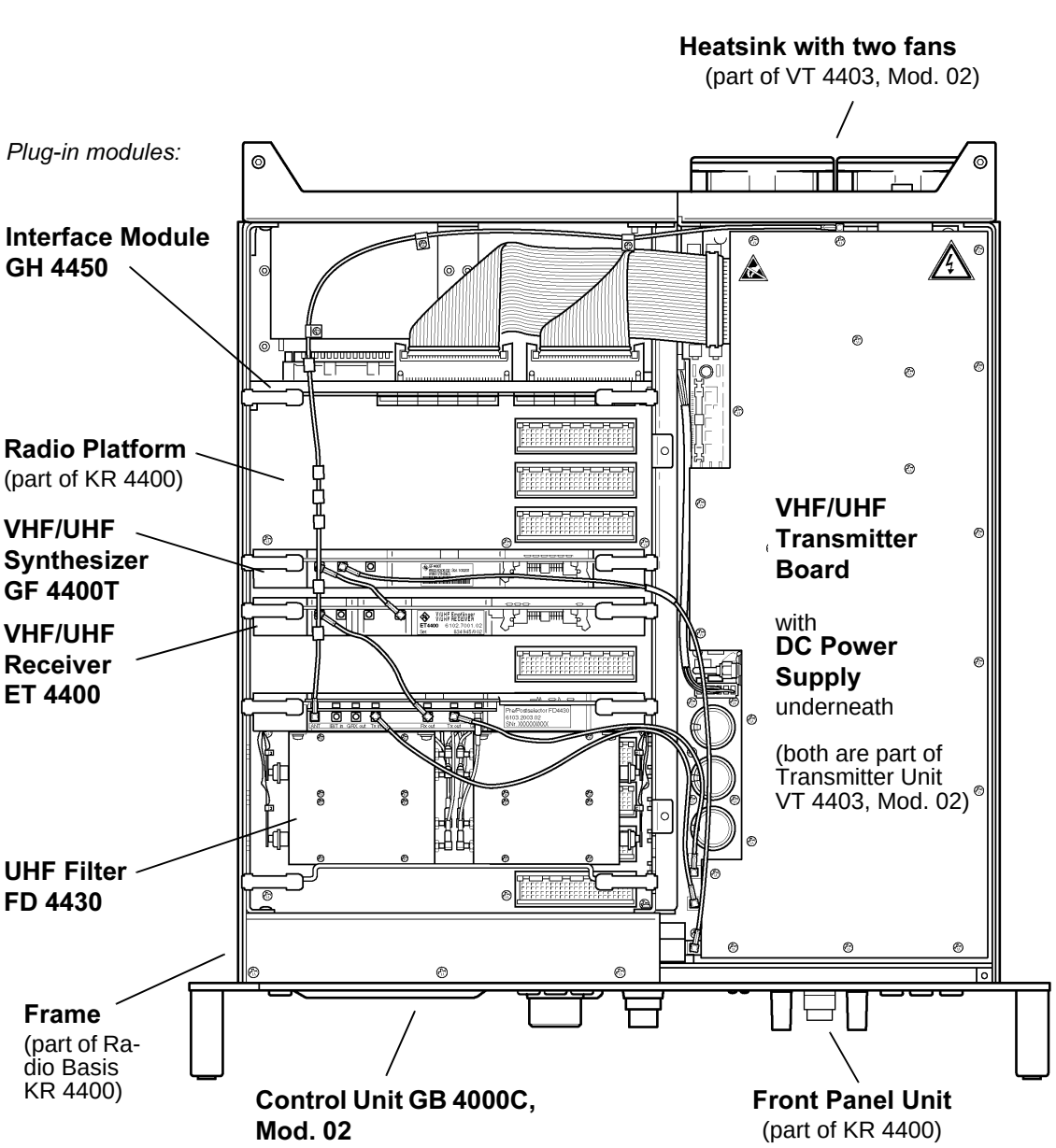
Fig. 1.2 Power Supply IN 4000A

1.5 Design, e.g. XT 4410A - Mod. 22

(See Fig. 1.3)

The M3SR Transceiver is accommodated in a sturdy 19" case of 3 height units, its top being formed by a detachable screwed-down metal cover. After removing this cover, the modules of XT 4410A become visible, which are:

- ❑ Radio Basis KR 4400, Mod. 04
  It is formed by several items, namely the mechanical parts chassis and housing, which accommodate the internal transceiver modules. Located in the left-hand part of the chassis is the radio platform, containing a number of interface connectors for interfacing with the internal subassemblies and also with the outside. For internal signal transfer a Radio Module Bus, consisting of Radio Control Bus and Radio Data Bus, is available. Another part of the radio basis is the Front Panel Unit, located directly at the front on the right. It contains various control and display elements such as LEDs and buttons, external connectors as well as a loudspeaker.
- ❑ VHF/UHF Receiver ET 4400 (main receiver)
  The receiver is a plug-in module located in one of the slots in the centre left-hand part of the chassis. It is of compact design, both sides being EMC-protected by appropriate shielding covers. Once plugged into the radio platform in its assigned slot, the receiver is held in place by quick-release fasteners.
- ❑ VHF/UHF Synthesizer GF 4400T
  The synthesizer is a plug-in module located in one of the slots in the centre left-hand part of the chassis. It is of compact design, both sides being EMC-protected by appropriate shielding covers. Once plugged into the radio platform in its assigned slot, the synthesizer is held in place by quick-release fasteners.
- ❑ Interface Module GH 4450
  The interface module is a plug-in module in the left-hand rear part of the chassis. At its top it carries several connectors for ribbon-cable connections towards the transmitter unit. In addition, the plug-in module contains three interfaces for the rear modules.
- ❑ Transmitter Unit VT 4403, Mod. 02
  The transmitter unit is a power module located in the right-hand part of the chassis and extending over its full depth. It is made up of the actual transmitter board at the top and the DC power supply located underneath. Both subassemblies are shielded by EMC covers. Also part of the transmitter unit is a heat sink with two fans, which are accommodated directly at the rear, also on the right-hand side.
- ❑ Control Unit GB 4000C, Mod. 02
  The control unit is located at the front on the left-hand side. It contains a display, control and display elements such as LEDs, fixed-function keys and softkeys, a keypad and a connector.
- ❑ UHF Filter FD 4430
  The UHF filter is a plug-in module located in the centre left-hand part of the chassis, next to the control unit. Once plugged into the radio platform in its assigned slot, the UHF filter is held in place by quick-release fasteners.



Note:

Radio platform connectors shown without protective caps.

Fig. 1.3 Top View of e.g. XT 4410A, Mod. 22 (without Cover)

1.6 Functioning, e.g. XT 4410A - Mod. 22

(See Fig. 1.4)

The Radio Platform contains the central processor (= server) of the M3SR Transceiver. Via LAN/Ethernet, the server is connected to its clients. Clients may be an integrated Control Unit GB 4000C (mod. 02) and/or further Control Units GB 4000C (mod. 03) connected via the LAN connector X20 and a LAN hub, or customer-specific devices. The clients plus the software package DS4400A form the MMI (= man-machine interface) of the M3SR Transceiver. Clients are controlled by using the GB2PP protocol. The MMI guides the operator through menu-based operating procedures and selectively visualizes all states on the display. Commands are entered by making use of the control elements and the keypad. Operation and indication of the transceiver's operating status are both menu-oriented, operator interaction is performed via the display and keyboard. The modules are controlled by the central processor via the Radio Module Bus (RMB). The Radio Platform stores all parameters relating to the individual modules. A system monitor monitors the temperatures and operating voltages. In a clock section all clock signals needed by the radio platform are generated. The RMB connects the modules of XT 4410A to one another and also to the central processor and the I/O interfaces. Serial interfaces are used for data transmission and remote control purposes. Parallel interfaces serve as discrete inputs and outputs and control for instance an externally connected filter and / or amplifier. An Audio Frequency Interface (AFI) processes the analog signals in digital form so that they can be transmitted digitally on the Radio Data Bus (RDB).

The Front Panel connected at the Radio Platform carries the control and display elements for handling the basic transceiver functions. An Ethernet port is available for sending and receiving data for service purposes (configuration and software download).

When the transceiver operates in receive mode, the RF signal is taken from antenna connector X30 to the VHF/UHF Transmitter Board. From here it is routed via a Tx/Rx switch to the UHF Filter FD 4430. The input stages of the filter are directly protected for electrostatic discharge. The filter is working for the VHF/UHF Receiver ET 4400 (main receiver) as a preselector to reduce the interfering levels from other radios of the platform. In the main receiver, the RF signal passes along a VHF path (100 to 224.975 MHz) or a UHF path (225 to 512 MHz) to the mixer stages. The mixer stages get the LO signal (365 to 652 MHz) from VHF/UHF Synthesizer GF 4400T. The AGC-controlled 2^{nd} IF signal with a frequency of 455 kHz is demodulated in the digital section of the receiver. The demodulated baseband signal is taken to the RDB for further processing.

In transmit operation, VHF/UHF Synthesizer GF 4400T generates a carrier frequency in the range from 100 MHz to 512 MHz. For amplitude modulation, this carrier frequency is modulated by the VHF/UHF Transmitter Board. FM signals (both analog FM and digital FSK signals) are generated by the synthesizer to be merely amplified by the VHF/UHF Transmitter Board (signal RF_Drive). After amplification and filtering, the resulting signal is made available at antenna connector X30. The UHF Filter FD 4430 is working as postselector. The filter chain is located within the transmit path of the radio. The selectivity of the filter chain reduces the transmitted noise energy of the radio which may degrade the sensitivity of other receiving radios on the platform.

Interface Module GH 4450 connects the RMB and discrete signals between the Radio Platform, the VHF/UHF Transmitter Board and up to three further rear modules. Switchover between transmission and reception is effected via the RMB.

The integrated DC Power Supply uses the +28-VDC input voltage to generate all voltages required in XT 4410A.

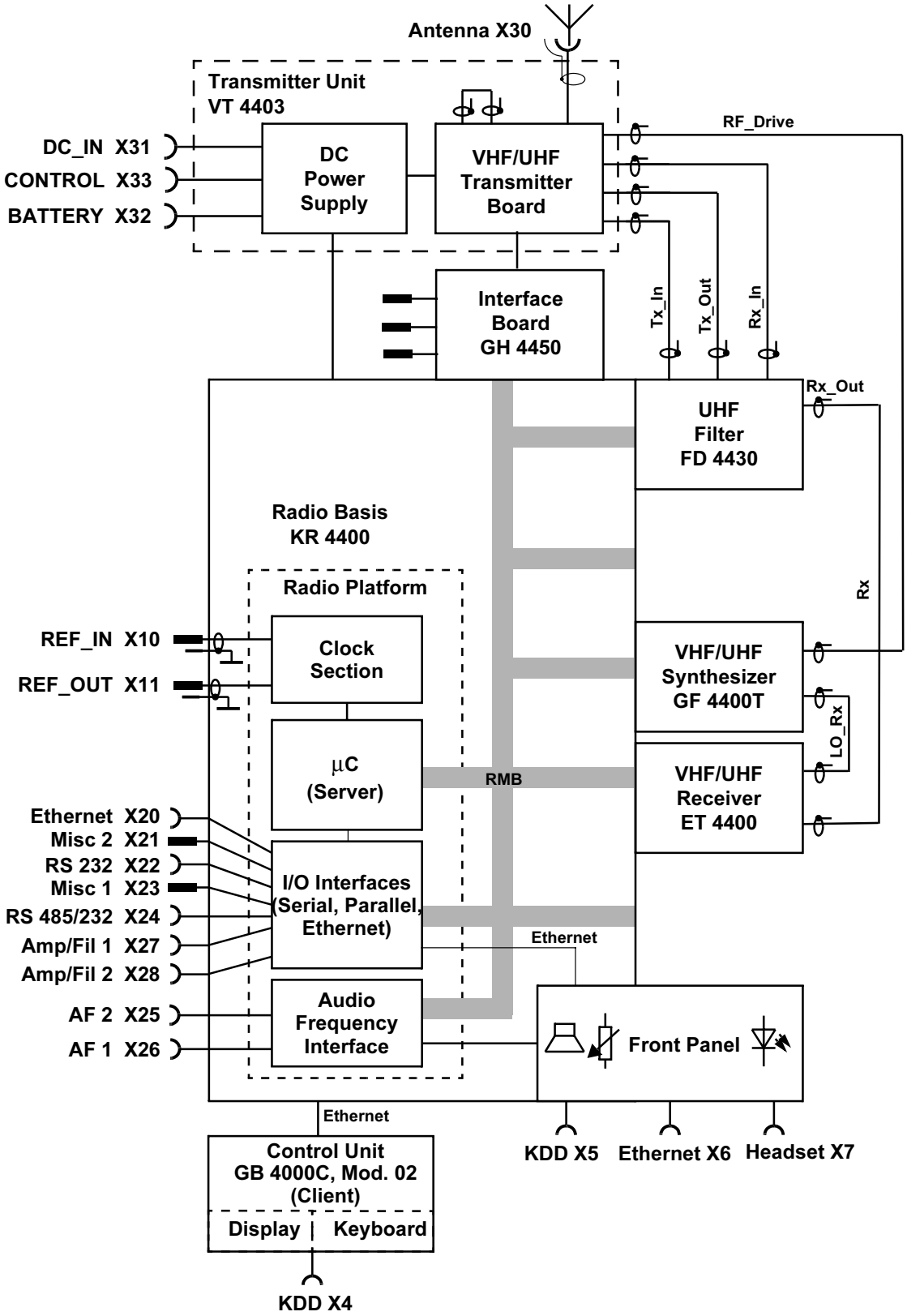


Fig. 1.4 Block Diagram of e.g. XT 4410A, Mod. 22

1.7 General Data

See data sheet for Digital Programmable Software Radios of Series M3SR in Appendix A1.

1.8 Detailed Safety Rules

Establish the cabling only if the transceiver is switched off.

When fitting operating rooms and installing and operating electrical equipment, the relevant national and international safety provisions and regulations have to be adhered to.

The following safety instructions apply in particular:

- ❑ IEC 364
- ❑ VDE 0100
- ❑ DIN 57100

These safety regulations deal with the following subjects:

- ➢ Protective measures:
  - Prevention of accidents
  - Overvoltage protection
  - Insulation of equipment
  - Grounding
- ➢ Type and laying of lines and cables
- ➢ Provisions for operational facilities, rooms and equipment requiring special handling

1.9 Accessories

Power Supply

IN 4000A

Control Units

GB 4000C, mod. 03
(remote version)

not shown:
GB 406.. on request

Filter and Amplifiers

FD 430

not shown:
VU 210L
VU 220L
VD 480L

Antennas

HK 014

not shown:
HK 012
HK 001

Handsets and Headsets

GA 015

not shown:
GA 012
GA 013
GA 016H1

Mating Connector

not shown:
ZF 4410

2. Use under Normal Conditions

2.1 Introduction

This chapter provides information concerning

- ❑ Unpacking and checking
- ❑ Installation into a 19" rack
- ❑ Basic cabling
- ❑ Operation
  - Introduction to Displays and Controls
  - Switching the Transceiver On and Off
  - Menu RADIO CONNECTION
  - Menu COMLINE SESSION
  - Menu MAIN
  - Menu MANUAL FIX. FRQ
  - Menu USER PRESET FIX.FRQ
  - Menu EMERGENCY MODE

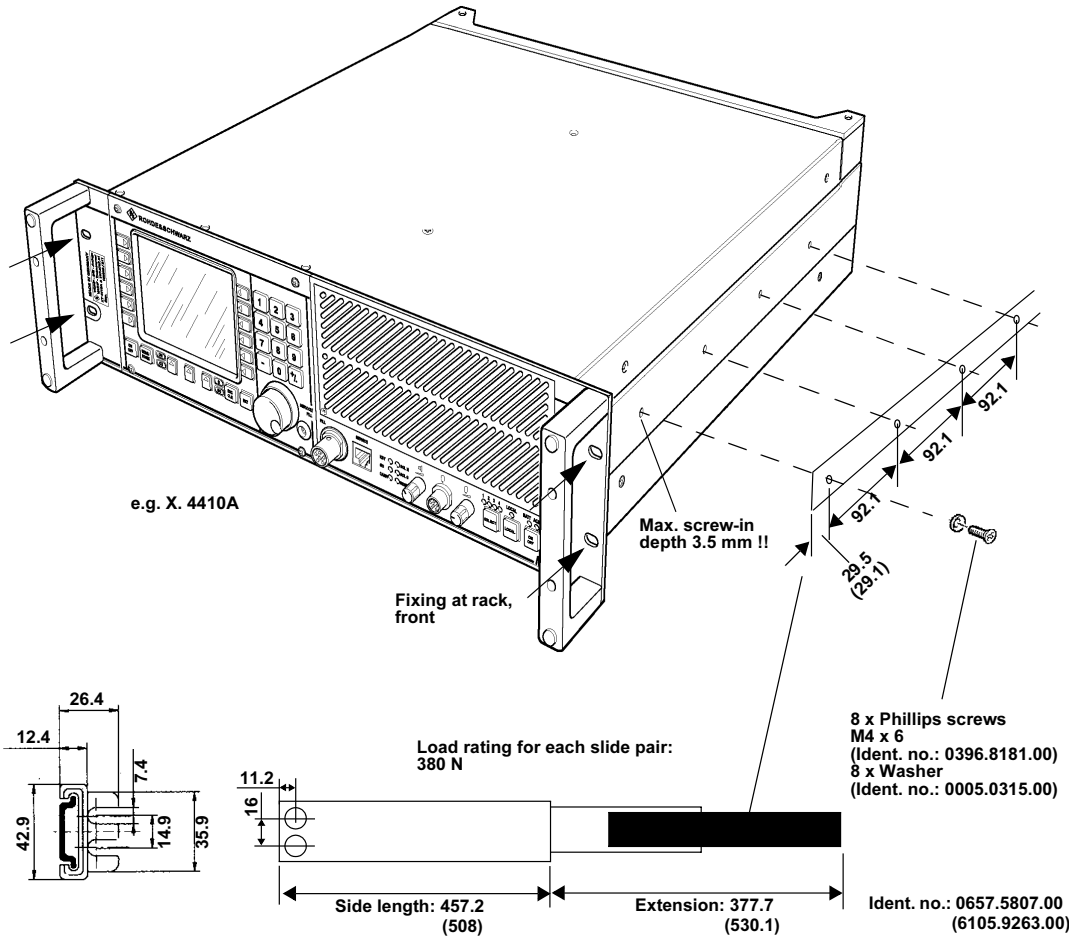
2.2 Unpacking and Checking

After delivery carry out the following steps:

1. Unpack the transceiver.
2. Check if delivery (transceiver and accessories) is complete by referring to the delivery note.
3. Check the transceiver and accessories for signs of damage which may have occurred during transit.
4. Contact the shipping agent immediately, if damage is found.
5. Keep the packaging (box etc.) for later use, e.g. if the transceiver is to be sent to the nearest R&S representative for repair (see address list following the title page of this manual).

2.3 Installation into a 19" Rack

(See drawing 6102.4002.01DF at the end of this chapter)



Note:

The telescopic slides are available on demand (ident. no. 0657.5807.00, only for racks providing for a seated depth of 600 mm and accessible from the rear, or 6105.9263.00 for trailing cable installation).

For installation into a 19" rack with telescopic slides proceed as follows:

1. Take the right-hand telescopic slide and extend it as far as it goes.
2. Press the automatic unlocking device and pull the innermost slide completely out.
3. Attach the innermost slide to the right-hand side panel of the transceiver by means of four Phillips screws and the associated washers (see figure above).
4. Take the left-hand telescopic slide and extend it as far as it goes.
5. Press the automatic unlocking device and pull the innermost slide completely out.
6. Attach the innermost slide to the left-hand side panel of the transceiver by means of four Phillips screws and the associated washers (see figure above).
7. Take the outer telescopic slides and mount them to the rack.
8. Insert the transceiver, with its slides fitted, into the extended slides of the rack and slide it in until the stop is reached.
9. Fasten the transceiver to the rack using four screws.
10. Cable the transceiver at its rear acc. to chapter 2.4.

2.4 Basic Cabling

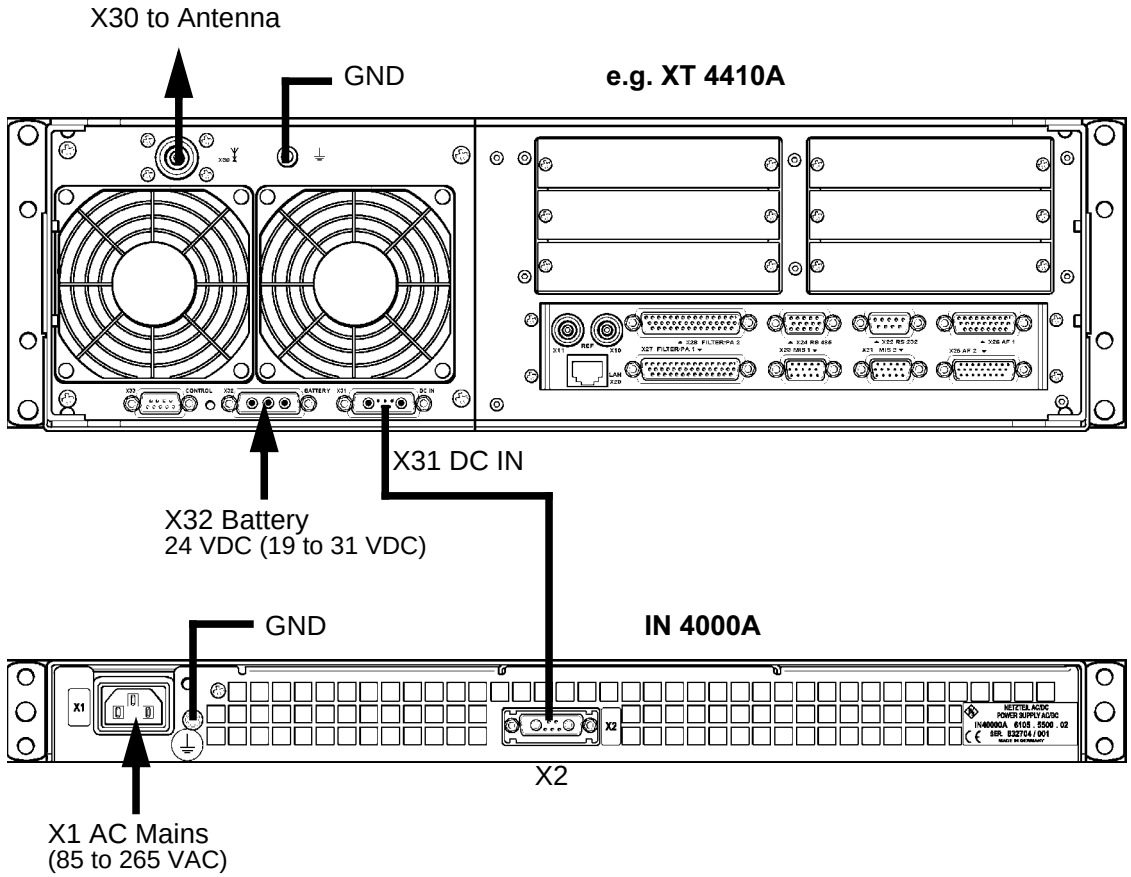
C A U T I O N

Connect the mains cable only after all other cabling has been made!

2.4.1 M3SR Transceiver, e.g. XT 4410A

2.4.1.1 Rear Cabling

Cabling to be made at the rear:



X31: DC IN is protected against reverse polarity (no function in this case).

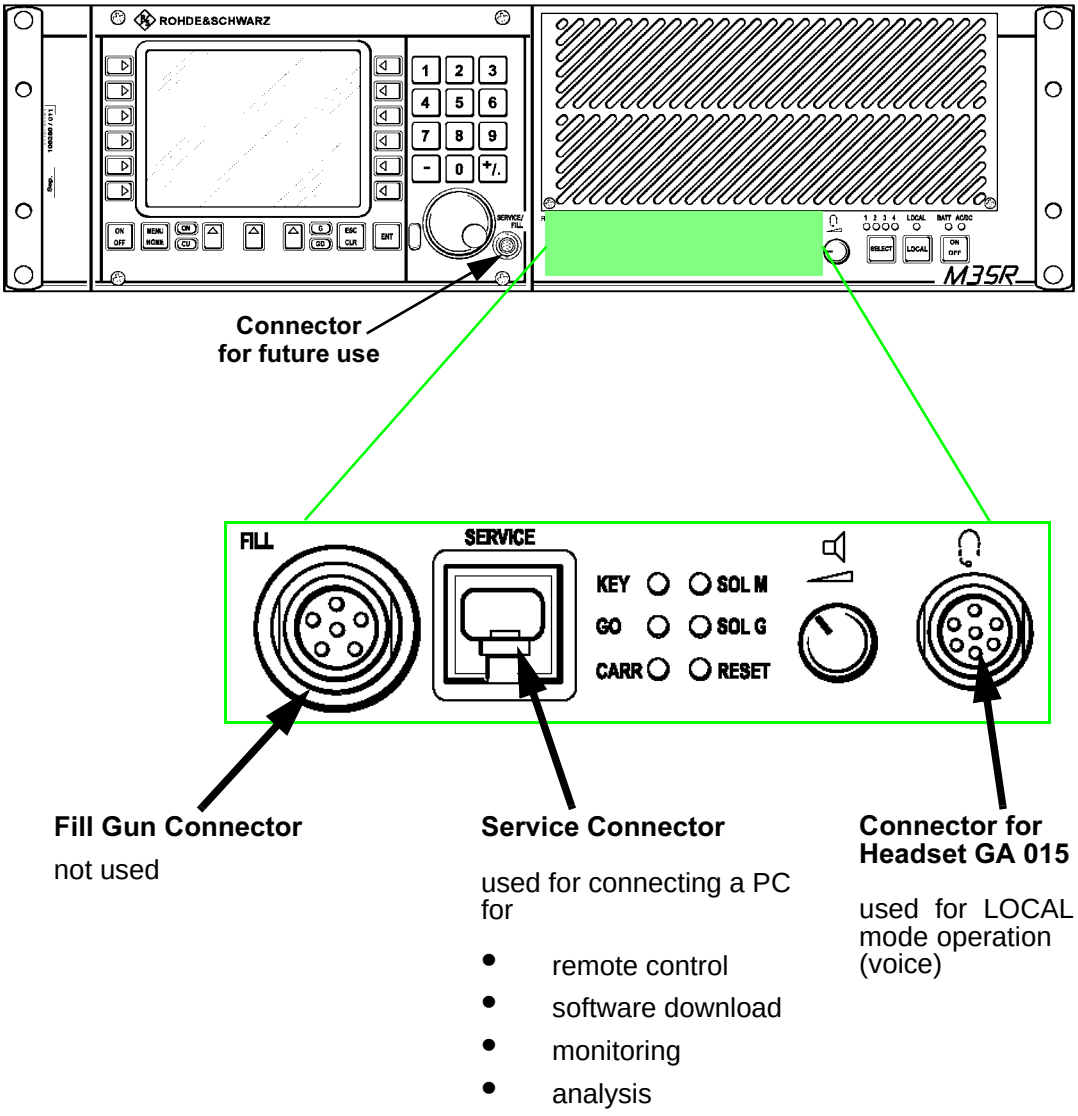
Note:

The connecting cable between connector X31 DC IN of XT 4410A and connector X2 of AC Power Supply IN 4000A is available on demand (order number 6105.5639.10, length = 1 m).

X32: Optional battery connection (+19 to +31 VDC, ≤ 25 A) for automatic switchover in the case of power failure.

2.4.1.2 Front Cabling

Cabling to be made at the front:



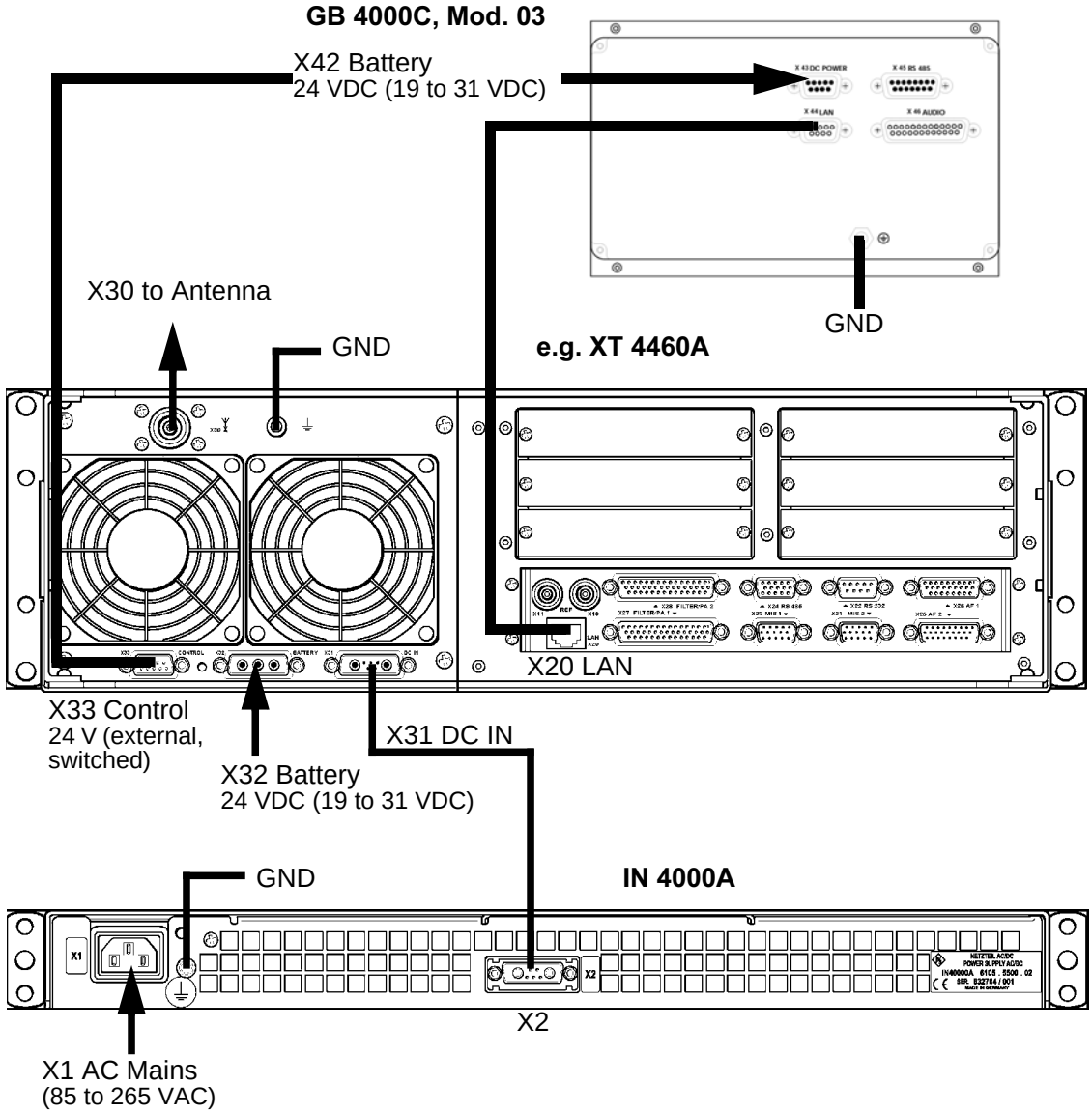
Note:

For detailed information on connectors and contact assignment see interface description in Appendix A1 "Technical Information".

2.4.2 M3SR Transceiver, e.g. XT 4460A

2.4.2.1 Rear Cabling

Cabling to be made at the rear:



X31: DC IN is protected against reverse polarity (no function in this case).

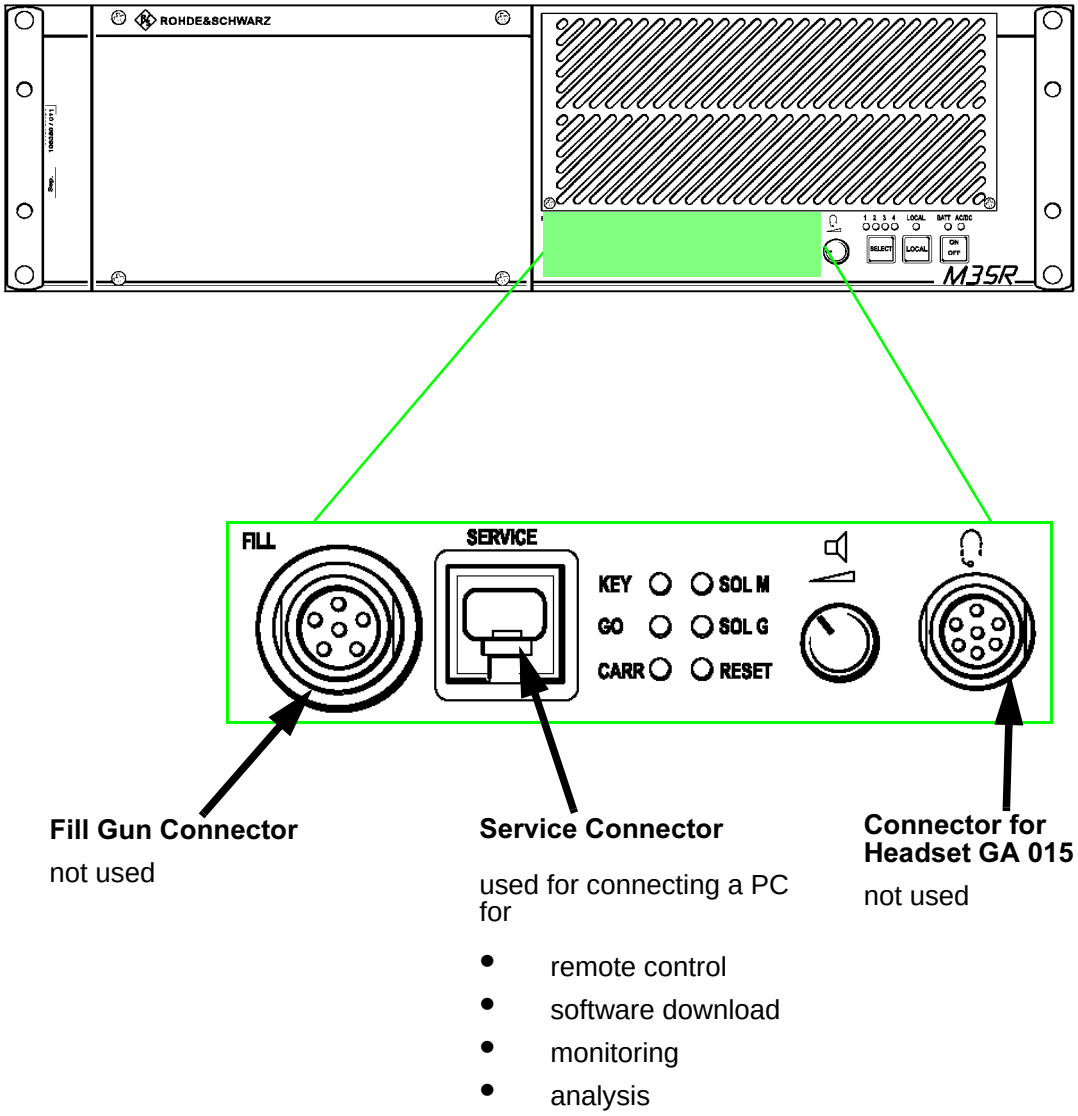
Note:

The connecting cable between connector X31 DC IN of XT 4460A and connector X2 of AC Power Supply IN 4000A is available on demand (order number 6105.5639.10, length = 1 m).

X32: Optional battery connection (+19 to +31 VDC, ≤ 25 A) for automatic switchover in the case of power failure.

2.4.2.2 Front Cabling

Cabling to be made at the front:



Fill Gun Connector

not used

Service Connector

used for connecting a PC for

- remote control
- software download
- monitoring
- analysis

Connector for Headset GA 015

not used

Note:

For detailed information on connectors and contact assignment see interface description in Appendix A1 "Technical Information".

2.5 Operation

2.5.1 Introduction to Displays and Controls

For transceiver control, a multi-function man-machine interface is provided, featuring

- ❑ Display
- ❑ Softkeys (menu-dependent multi-functional keys)
- ❑ Keys with a fixed function (such as ON / OFF switch, ENTER key, numerical keypad, cursor control keys)
- ❑ Key combinations
- ❑ Controls (such as volume control and rotary knob)
- ❑ Indicators (LEDs signalling the operating status)

2.5.1.1 Display (only X. 4410A)

Reflecting its design as a software radio, the M3SR Transceiver controlled via GB 4000C relies on a menu-based control concept, the operator being guided through the individual menus and submenus and having a variety of selection options.

This chapter assumes that the individual functions or submenus are called up starting on the main menu level. If necessary, press key MENU HOME (see chapter 2.5.1.4) to go to the main menu straight from any other level.

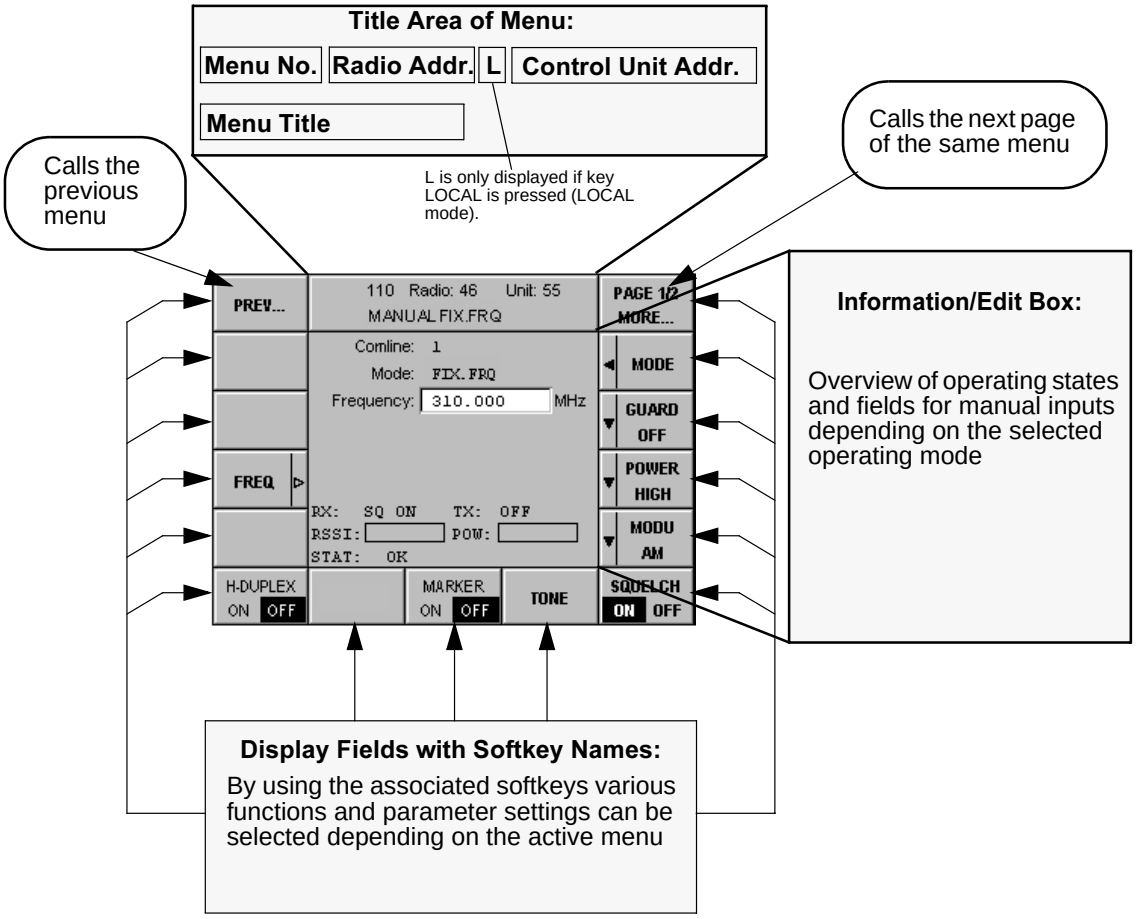
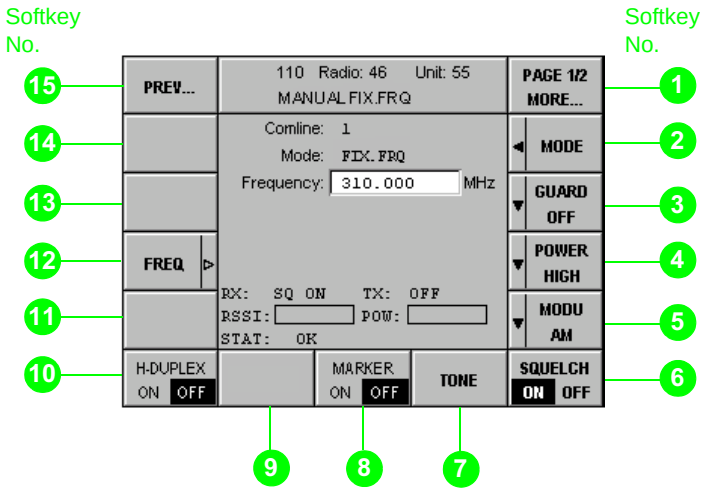


Fig. 2.1 Design of Display (Principle)

2.5.1.2 Softkeys (only X. 4410A)

2.5.1.2.1 Softkey Numbers



The softkey numbering as shown by the example above is maintained throughout this chapter.

2.5.1.2.2 Explanation of Softkey Symbols

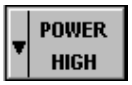
The use of symbols in the menu-dependent softkey designations follows some simple rules:

This menu contains two pages. The page currently shown is page one.

One menu is following, which is opened by pressing the softkey. The current setting is shown in the direction pointed out by the black arrowhead.

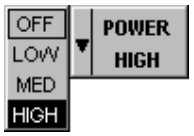
Example:

This menu is disabled right now (letters light-faced, i.e. not bold) or it is not present.



One menu is following. The current setting is shown in the second line (example: HIGH).

Example:



Toggle switch with two functions, the currently active function is highlighted.

Fixed function: The tone is produced as long as you keep pressing the key.

(Three dots): Further menus are following.

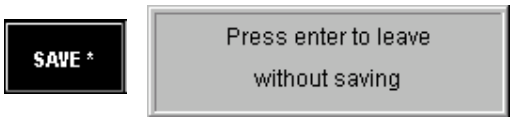
After pressing the associated softkey a parameter can be entered/edited manually. In the direction pointed out by the arrowhead, the value (e.g. frequency) is displayed.

Example:

Press to return to previous menu.

The asterisk (*) indicates that the new settings have not yet been stored.

When the menu is left without storing the new settings, a warning comes up.



☞ Press softkey SAVE * to save the current data or

☞ Press key ENT to discard the changes and leave.

Some basic concepts need to be explained in order to fully understand the following chapters.

2.5.1.2.3 Value Selection

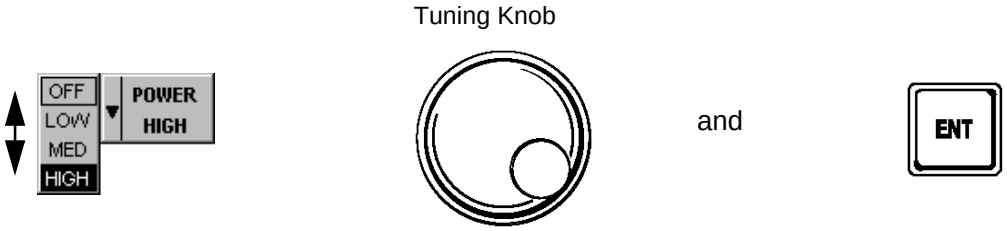
❑ Selection within a set of values (example: power) can be made in different ways:

1. Press the appropriate softkey associated to the relevant display field as many times as required, selection being made in forward direction. Confirm by pressing the ENTER key. The previously set value remains highlighted until a new setting is selected and confirmed with ENTER.

   Example:

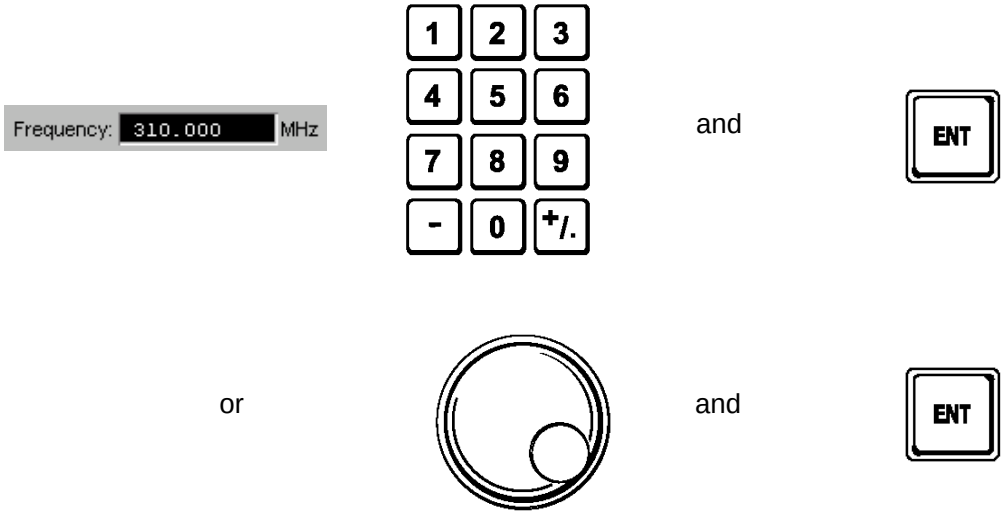
2. Select by turning the tuning knob (in either direction). Confirm by pressing the ENTER key.

   Example:



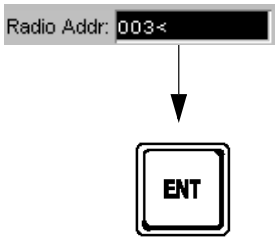
❑ Numerical values (example: frequency) can be set by using either the numerical keypad or the tuning knob and the ENTER key.

   Example:



- An arrow after a figure means that if this numerical value has been changed it must be confirmed with ENTER.

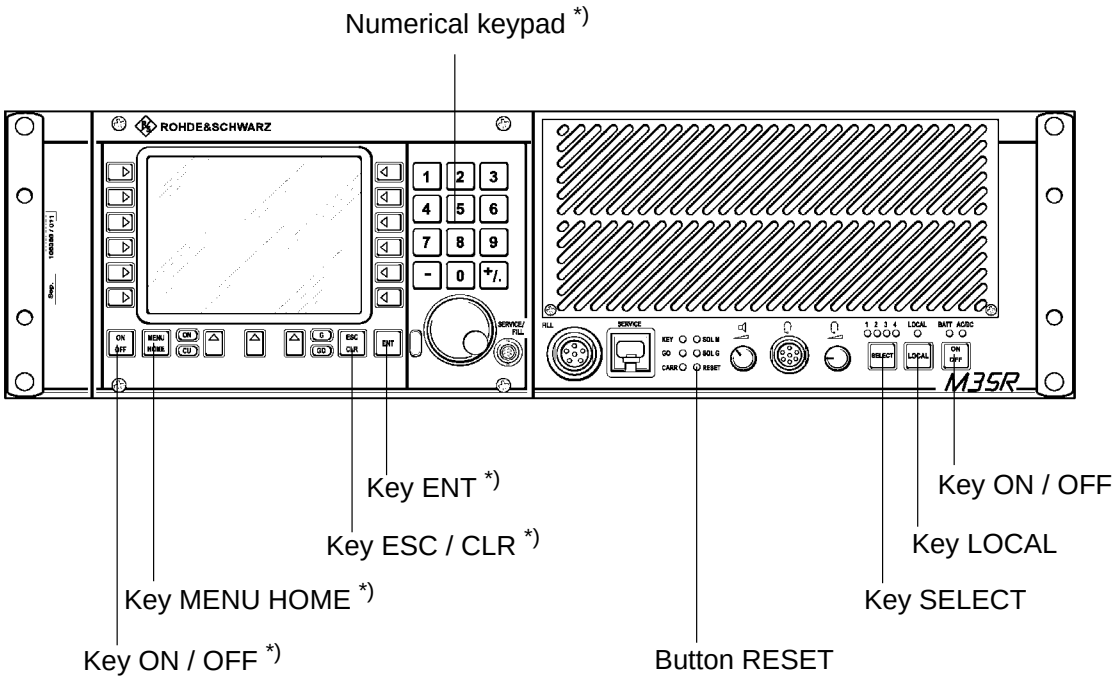
  Example:



- Toggle switches are actuated by just pressing the appropriate softkey, i.e. without ENTER.

  Example:

2.5.1.3 Keys with Fixed Function



*) only X. 4410A

- ❑ **ON / OFF** Key (Control Unit GB 4000)

  Switching the transceiver on (but not off), or during operation switching the display off and on again.
- ❑ **MENU HOME** Key (Control Unit GB 4000)

  Switching the transceiver to the Menu 040 (MAIN) straight from any other level.
- ❑ **ESC / CLR** Key (Control Unit GB 4000)

  Deleting entries or aborting processes.
- ❑ **ENT** Key (Control Unit GB 4000)

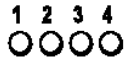
  Confirming entries or initiating processes.
- ❑ Numerical keypad (Control Unit GB 4000)

  Input of numerical values and decimal point and in- or decrementing selection.
- ❑ **RESET** Button (Front Panel)

  When pressing this button all software in the transceiver will be reset and after a short time the software will be restarted. The last activated menu will be displayed.

❑ **SELECT** Key (Front Panel)

By using the SELECT key one of the AF sources for the loudspeaker can be selected that have been configured in Menu 575 (FRONTPANEL AUDIO SOURCE), e.g. CL1 (Comline) or Guard U/V. A Comline is a functional unit of radio modules.



LED 1 lighted

1. Press key 

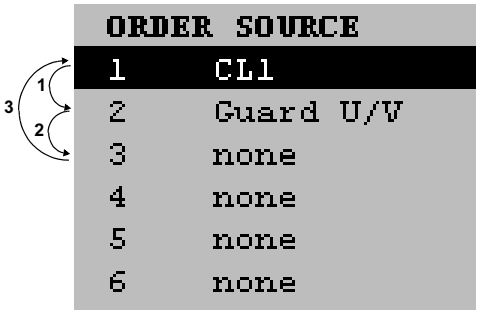
LED 1 and 2 flashing

2. Press key 

none of the LEDs lighted

3. Press key 

LED 1 lighted



When CL1 is selected as AF source and communication mode V/D UNCP is active, the guard receiver AF signal can be output at the loudspeaker in addition to the main receiver AF signal, depending on the GUARD configuration (see Menu 110, page 1 (MANUAL FIX.FRQ) and Menu 210, page 1(MANUAL PRESET FIX.FRQ)).

After power-on, Comline 1 is selected by default. This is indicated by illumination of LED 1.

The following table shows how LEDs 1 and 2 are related and which AF signal is output by the loudspeaker:

LED		AF signal
1	2	
		no AF signal
lighted		AF signal of main receiver and in addition of guard receiver, if switched on via softkey GUARD in Menu 110 (MANUAL FIX.FRQ) or 210 (USER PRESET FIX.FRQ).
flashing		AF signal of guard receiver (VHF band)
	flashing	AF signal of guard receiver (UHF band)
flashing	**flashing**	AF signal of guard receiver (VHF and UHF bands)

❑ **LOCAL** Key (Front Panel)

Note:

Using this key only makes sense with M3SR Transceiver X. 4410A.

Activate local mode.

LED LOCAL lights up.

In the menu title area an 'L' comes up.

The transceiver is controlled exclusively via Control Unit GB 4000C, mod. 02. In local mode the same functions are available as in remote mode, although here only communication mode V/D UNCP makes sense.

Running remote control sessions (fixed, advanced) are terminated.

Control units, which may be connected, are able to operate in remote control sessions (monitoring) only.

In local mode the four audio lines (NB1, WB1, NB2, WB2) have no function. In voice mode (V/D UNCP) the signal from the headset interface is used for carrier modulation. The demodulated AF signal will be made available also at the headset interface.

ALC (automatic level control) is performed in the front panel unit, compensating volume variations of voice signals. The Tx ALC cannot be disconnected.

Carrier activation is performed in voice mode (V/D UNCP) via the headset interface.

In Menu 550 (PTT COMLINE MAPPING) the four PTT lines (PTT_1, PTT_1L, PTT_2, PTT_2L) can be configured also for local mode. For more details on PTT mapping refer to chapter 3.

Note:

We recommend not to configure the PTT lines for local mode, as this may result in unwanted carrier activation by one of the connected devices.

When local mode is left by pressing the LOCAL key, all settings which were active when remote mode was last left will be reactivated. However, changes made in Menus 400 (RADIO MAINTENANCE) and 600 (RADIO SETUP) will be preserved!

For more details on communication modes, sessions, line mapping etc. see chapter 3.

❑ **ON / OFF** Key (Front Panel)

Switching the transceiver on or off.

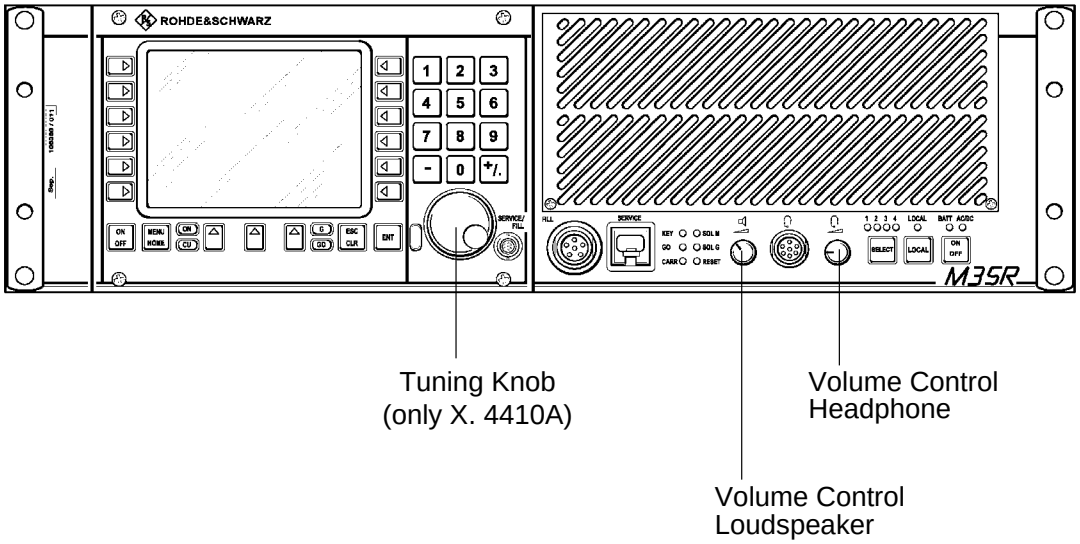
2.5.1.4 Key Combinations

By hitting the following key combinations on Control Unit GB 4000C and the Front Panel, respectively, special commands can be given to the M3SR Transceiver.

Key combination on Control Unit (only X. 4410A)	Description / effect on M3SR Transceiver
ESC/CLR and **ON/OFF** or **ESC/CLR** and **Key 1**	The radio initiates an Emergency Clear. This works always, i.e. also in a Monitoring Session. No Advanced or Fixed Session is required. Zeroize is available as output signal at connector contact X26.24 (AF1) (refer to interface description in Appendix A1). In the case that a Cipher Unit KY58 is connected, emergency clear will erase the KY58 data.
MENU HOME and **ENT** at the same time	Initiates the procedure for system PIN number input (see chapter 3). System PIN numbers cannot be changed since they are firmly tied to the hardware.
The following 4 keys at the same time: **Upper left softkey** and **ON/OFF** and **upper right softkey** and **ENT**	Initiates a control unit RESET. The control unit then re-establishes the remote control connection to the radio and displays the last menu active before the RESET.

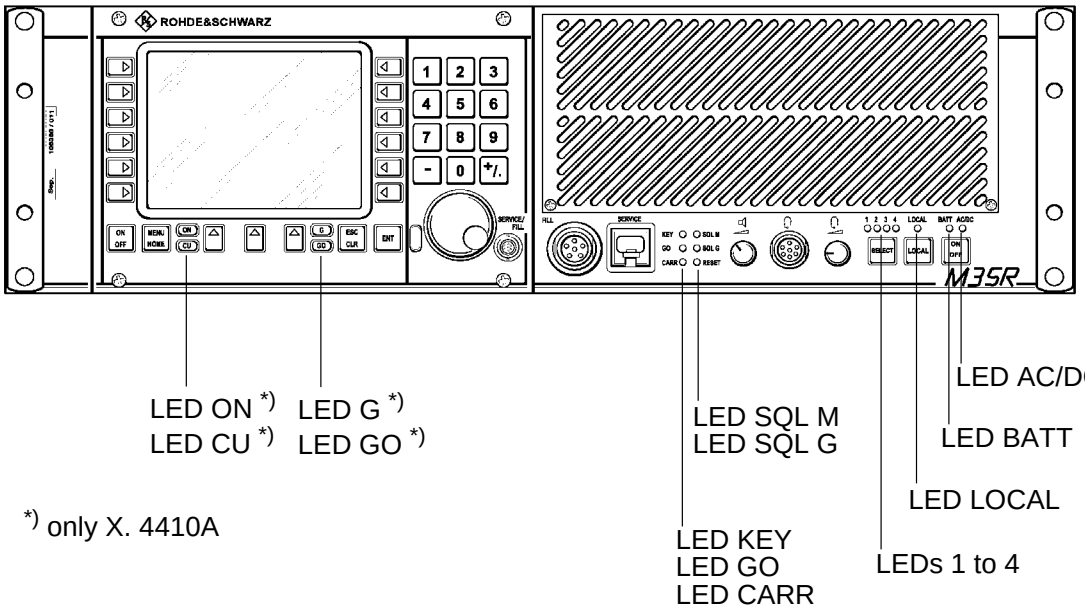
Key combination on Front Panel	Description / effect on M3SR Transceiver
SELECT and 10 x **LOCAL** within 10 sec	Sets the default IP (Internet Protocol) address: Platform CPLAT set to 192.168.52.46 This is necessary when incorrect IP addresses were entered and the default IP address is to be used again for establishing a remote control connection to a radio.

2.5.1.5 Controls



- ❑ Tuning Knob (Control Unit GB 4000)
  Selecting values.
- ❑ Loudspeaker Volume Control (Front Panel)
  Adjusting volume:
  Low: control turned fully counter-clockwise
  Full: control turned fully clockwise
- ❑ Headphone Volume Control (Front Panel)
  Adjusting volume:
  Low: control turned fully counter-clockwise
  Full: control turned fully clockwise

2.5.1.6 Indicators



*) only X. 4410A

- ❑ LED **ON** (Control Unit GB 4000)
  is illuminated when the control unit is on.
- ❑ LED **CU** (Control Unit GB 4000)
  is illuminated when the control unit is fully operative.
- ❑ LED **G** (Control Unit GB 4000)
  lights up when the guard receiver squelch opens.
- ❑ LED **GO** (Control Unit GB 4000)
  is illuminated when the transceiver is fully operative.
- ❑ LED **KEY** (Front Panel)
  signals that a device connected at the Fill Gun connector has been detected and that the transceiver is ready to load data.
- ❑ LED **GO** (Front Panel)
  signals that the M3SR Transceiver is fully operative.
- ❑ LED **CARR** (Front Panel)
  signals availability of a carrier signal at the antenna connector in transmit operation.
- ❑ LED **SQL M** (Front Panel)
  indicates reception of a signal by (main) Receiver ET 4400 (squelch).

❑ LED **SQL G** (Front Panel)

indicates reception of a signal by Guard Receiver ET 4400G.

❑ LEDs **1** to **4** (Front Panel)

indicate which signal is being output via the loudspeaker (3 + 4 presently not used):

LED				AF signal
1	2	3	4	
				no AF signal
lighted				AF signal of main receiver and in addition of guard receiver, if switched on via softkey GUARD in Menu 110 (MANUAL FIX.FRQ) or 210 (USER PRESET FIX.FRQ).
flashing				AF signal of guard receiver (VHF band)
	flashing			AF Signal of guard receiver (UHF band)
flashing	**flashing**			AF signals of guard receiver (VHF and UHF bands)

❑ LED **LOCAL** (Front Panel)

is illuminated when the LOCAL key has been pressed, indicating that the transceiver can be controlled only locally via the integrated control unit. In addition, a headset (PTT key, microphone), which may be connected, will be enabled as well.

❑ LED **BATT** (Front Panel)

signals availability of battery power.

❑ LED **AC/DC** (Front Panel)

signals availability of AC/DC power.

2.5.2 Switching the Transceiver On and Off

2.5.2.1 M3SR Transceiver X. 4410A

2.5.2.1.1 Minimum Requirements

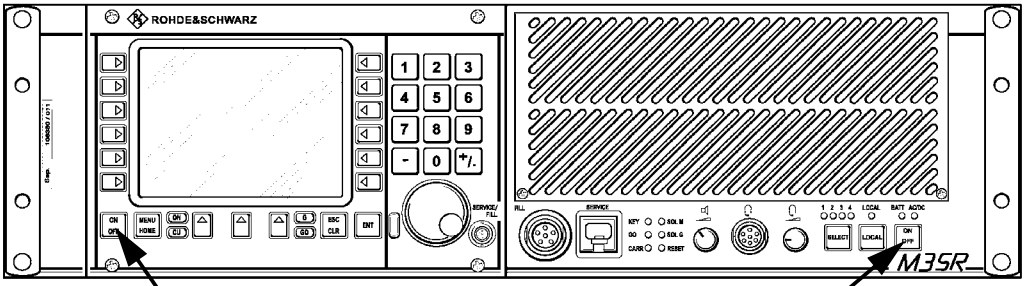
Before putting the M3SR Transceiver X. 4410A into operation make sure that the following minimum requirements are met:

- AC Power Supply IN 4000A (or a battery complying with the technical specifications) is available.
- Antenna is connected.
- Handset or headset is connected.
- See also chapter 2.4 "Basic Cabling".

2.5.2.1.2 Switching On

Note:

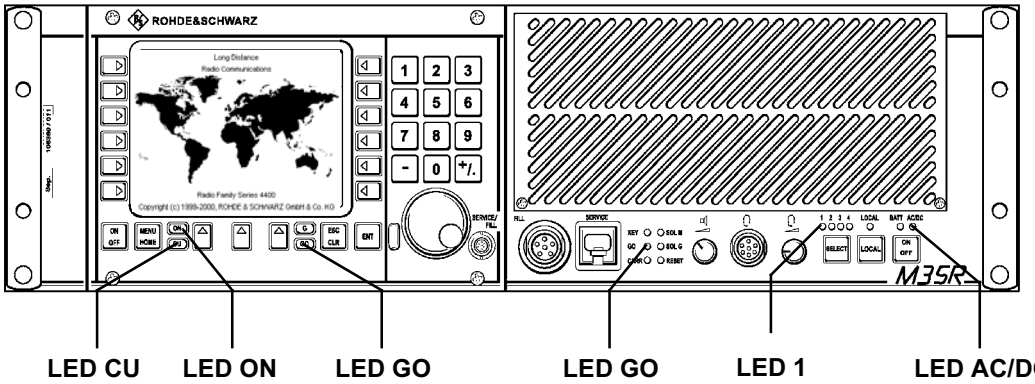
When starting up the transceiver, the last menu which was active before switching off is called up again, or the prompt for PIN entry comes up if the last menu was PIN-protected.



Key ON/OFF
switches the transceiver on (but not off), or during operation switches the display off and on again

Key ON/OFF
switches the transceiver on / off

☞ Press key ON / OFF on the Front Panel or Control Unit GB 4000C (see figure).



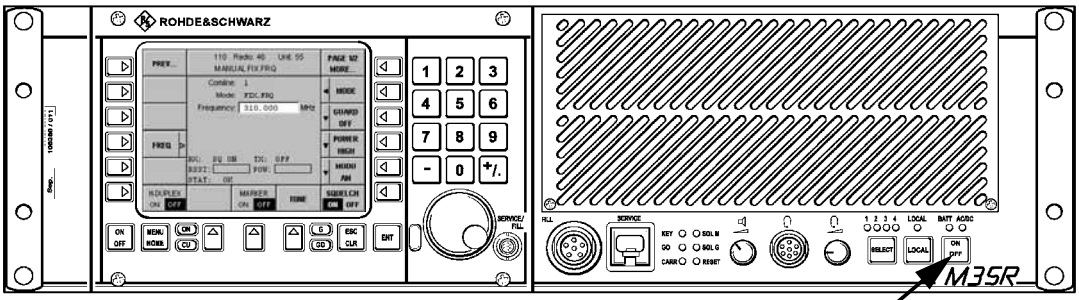
- ❑ All LEDs pointed out above are illuminated to indicate readiness for operation, their individual messages are:
  - LED ON: control unit ready for operation
  - LED CU: control unit ok
  - LEDs GO: radio ok
  - LED AC/DC: power available
  - LED 1: indicates which signal is being output via the loudspeaker

Note:

If LED 1 remains dark, press the SELECT key.

- ❑ The last activated menu is called up again, or the prompt for PIN entry comes up if the last menu was PIN-protected.

2.5.2.1.3 Switching Off



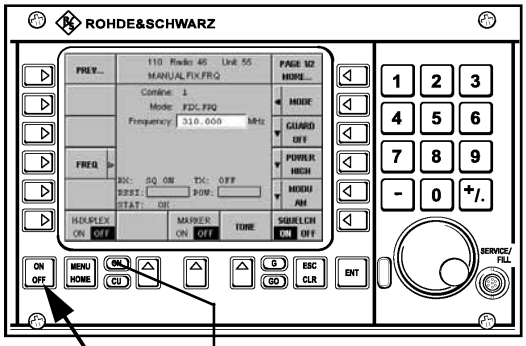
Key ON/OFF
switches the transceiver on / off

☞ Press key ON / OFF on the Front Panel.

❑ Control Unit GB 4000C, mod. 02 (left-hand part of the control panel) may be switched off separately by using the ON/OFF key on its front panel. In this case the display will go dark although the radio is still operative.

Note:

The control unit display will also be dark while the screen saver is active.



switches the control unit display off and on

☞ Press key ON/OFF.

❑ Display goes dark and LED ON is extinguished.

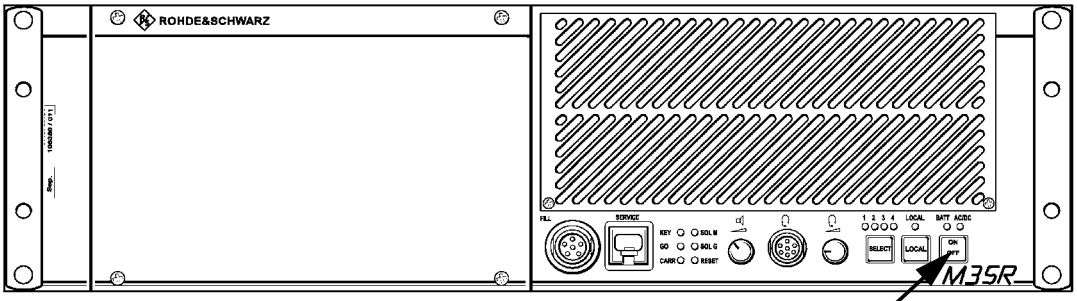
2.5.2.2 M3SR Transceiver X. 4460A

2.5.2.2.1 Minimum Requirements

Before putting the M3SR Transceiver X. 4460A into operation make sure that the following minimum requirements are met:

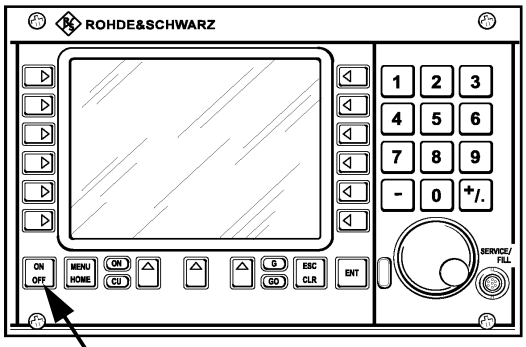
- Control Unit GB 4000C, mod. 03 (remote version) is connected with the transceiver via LAN.
- Control Unit GB 4000C, mod. 03 is connected with the power distribution system.
- AC Power Supply IN 4000A (or a battery complying with the technical specifications) is available.
- Antenna is connected.
- See also chapter 2.4 "Basic Cabling".

2.5.2.2.2 Switching On



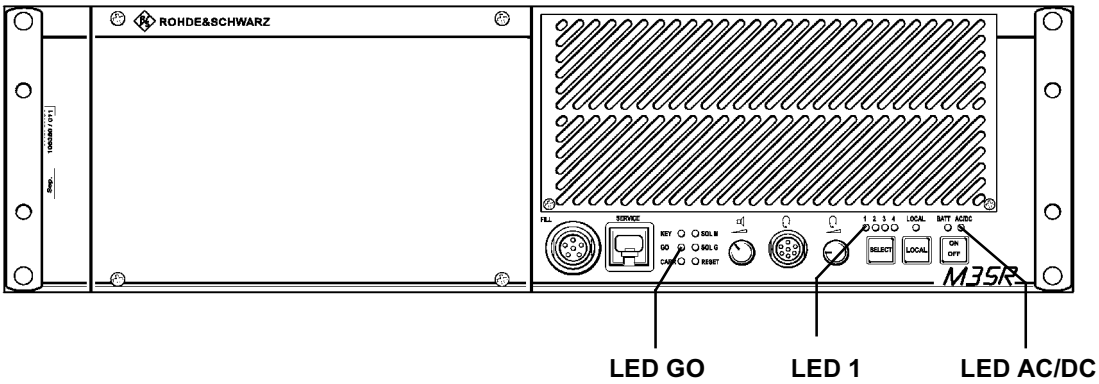
switches the transceiver on / off **Key ON/OFF**

☞ Press key ON / OFF on the Front Panel (see figure).

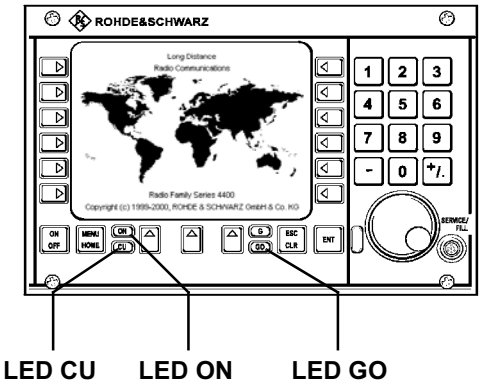


Key ON/OFF switches the control unit on / off

☞ Press key ON / OFF on Control Unit GB 4000C, mod. 03.



Control Unit GB 4000C, Mod. 03



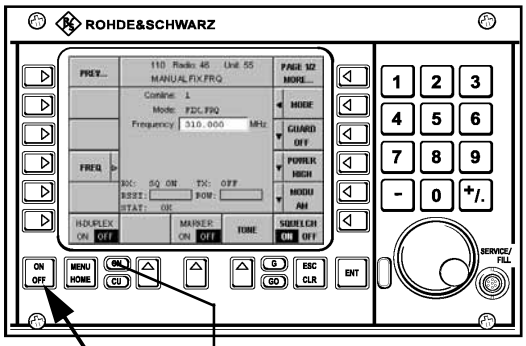
- ❑ All LEDs pointed out above are illuminated to indicate readiness for operation, their individual messages are:
  - LED ON: control unit ready for operation
  - LED CU: control unit ok
  - LEDs GO: radio ok
  - LED AC/DC: power available
  - LED 1: indicates which signal is being output via the loudspeaker

Note:

If LED 1 remains dark, press the SELECT key.

- ❑ The last activated menu is called up again, or the prompt for PIN entry comes up if the last menu was PIN-protected.

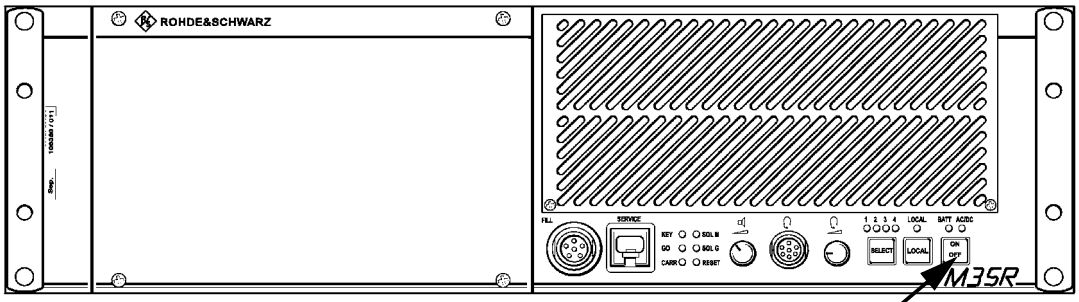
2.5.2.2.3 Switching Off



Key ON/OFF switches the control unit display off and on

☞ Press key ON / OFF on Control Unit GB 4000C, mod. 03.

❑ LED ON is extinguished.



Key ON/OFF
switches the transceiver on / off

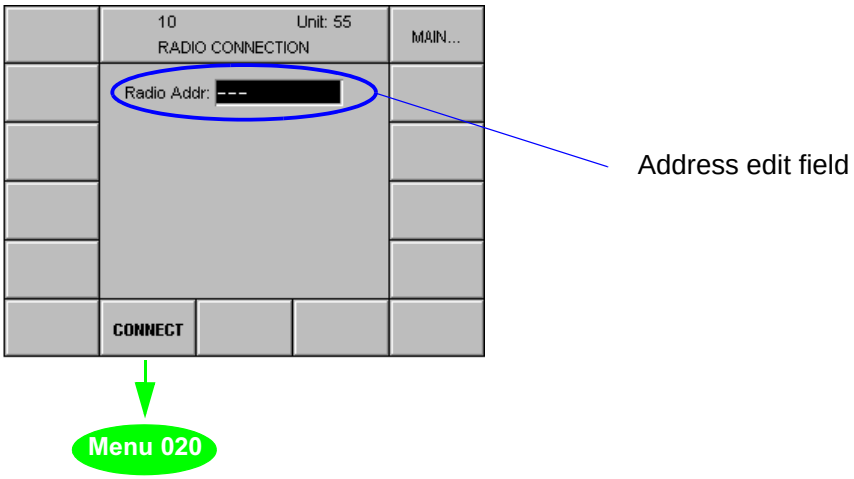
☞ Press key ON / OFF on the Front Panel.

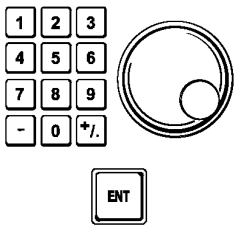
2.5.3 Menu 010: RADIO CONNECTION

Via Menu 010 the link setup between Control Unit GB 4000C and the radio is done.

Starting point: Switching On

❑ The following display appears:



No.	Control	Action	Notes
		Set address. Confirm with ENTER.	Setting logical radio address in the range from 001 to 999. *Note:* *When the M3SR Transceiver is operated in a network, the addresses need to be configured via Menus 436 (RADIO ADDRESS ROUTE, 835 (ADDRESS LIST) and 836 (CU ADDRESS ROUTE).*

When putting the radio into operation the first time:

☞ Enter default address 46.

When the entered address does not permit to connect to the transceiver:

Check if the address is in the control unit's address list.

1. Press key MENU HOME

Menu 040 (MAIN)

2. Press softkey CU... MAINT

Menu 800 (CU MAINTENANCE)

3. Enter control unit maintenance PIN number by using the numerical keypad, then press enter.

4. Press softkey ADDRESS LIST...

Menu 835 (CU ADDRESS LIST)

➢ This menu displays all addresses of devices the control unit can connect to.

➢ If necessary, enter the required address in the address list.

2.5.4 Menu 020: COMLINE SESSION

In Menu 020 the operator can define the level of access, switch from COMLINE Session to RADIO Session (Menu 030) or cut the connection between control unit and radio, if necessary.

The COMLINE session is the normal operating mode of the radio where all the COMLINE radio operation parameters are set via Menus

- 110 (MANUAL FIX.FRQ),
- 210 (USER PRESET FIX.FRQ) and
- 300 (EMERGENCY).

Menus 400 (RADIO MAINTENANCE), 600 (SETUP) and 800 (CU MAINTENANCE) are accessible only by entering the respective PINs. The assignment of modules to particular Comlines cannot be changed in a COMLINE session. For this a RADIO session is required, which is activated by entry of the respective PIN.

In the COMLINE session the following three levels of access are available:

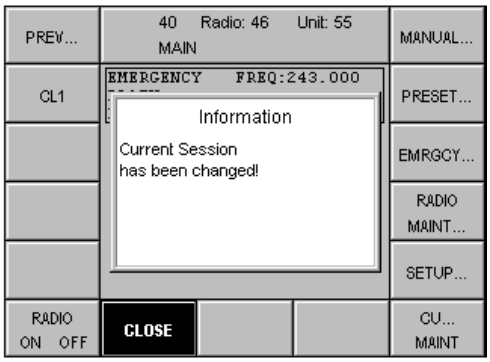
- ❑ FIXED
- ❑ ADVANCED
- ❑ MONITOR

- FIXED
  - In a FIXED COMLINE session, a fixed remote control connection is established between the own control unit and the radio which cannot be broken by third parties.
  - Therefore FIXED COMLINE session is used whenever continuous remote control is required.

C A U T I O N

In a FIXED COMLINE session, it is impossible for further control units, which may be connected, to take remote control of the radio. An exception to this is LOCAL mode which has top priority. So when pressing the LOCAL key a FIXED COMLINE session will be interrupted!!

- ADVANCED
  - In an ADVANCED COMLINE session, the remote control connection between a control unit and the radio can be broken by a third party. When another control unit has taken remote control of the radio, the display of the local control unit visualizes a message to this effect.

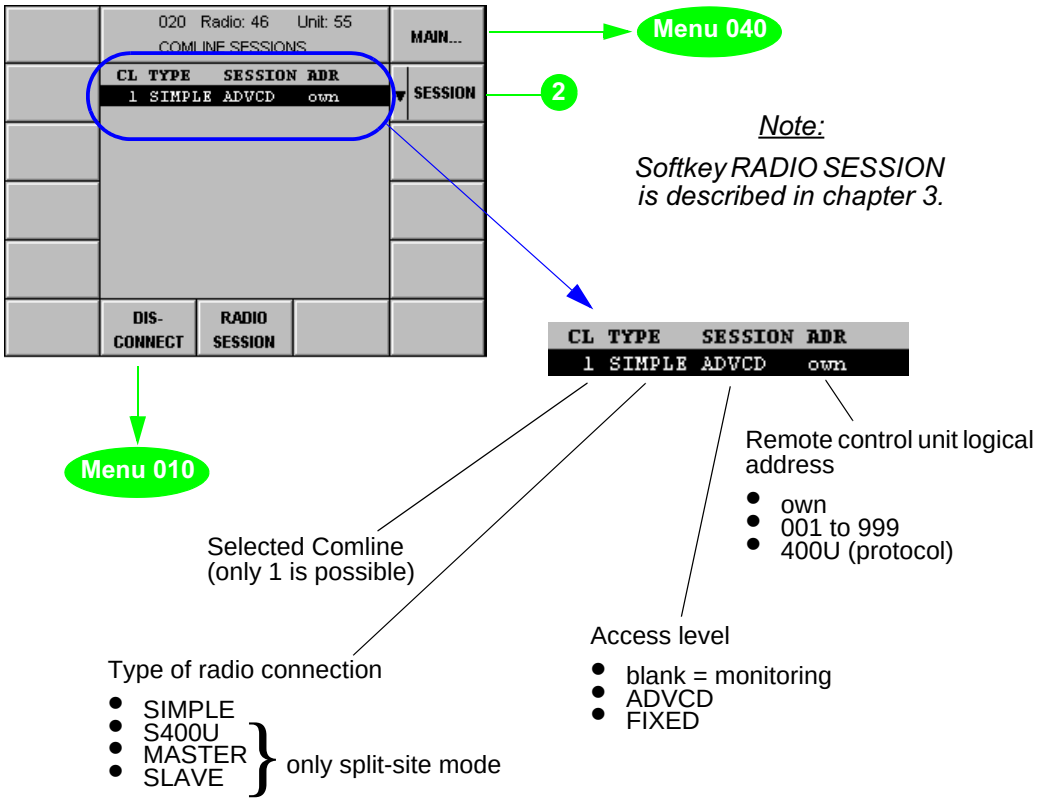


  - ADVANCED COMLINE session is used in normal radio control operation.

- MONITOR
  - In a MONITOR COMLINE session, the operator is able to passively monitor on the display of the control unit how control of the radio by another control unit is proceeding. Active radio control via the own control unit is disabled.
  - MONITOR COMLINE session is used for monitoring radio control.
  - MONITOR COMLINE session suffices for maintenance actions accessible via PIN.

Starting point: Menu 010 (RADIO CONNECTION)

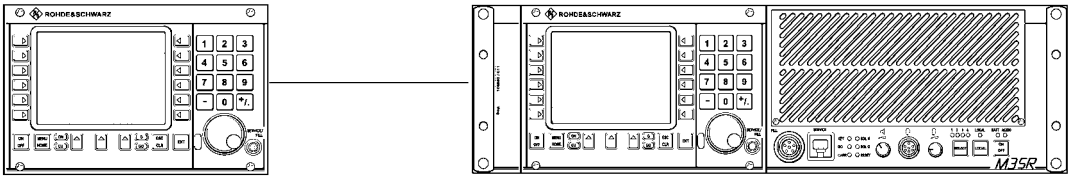
☞ Press softkey (9) **CONNECT** and the following display appears:



No.	Control	Action	Notes
2	MONIT / ADVCD / FIXED ▼ SESSION	Press softkey SESSION. Select setting.	Selection of access level **MONIT:** Only monitoring operation. **ADVCD:** Command authority can be withdrawn. **FIXED:** Command authority cannot be withdrawn.

2.5.4.1 Example

The example below illustrates a control scenario of one transceiver and two control units, the command authority changing between the two control units.



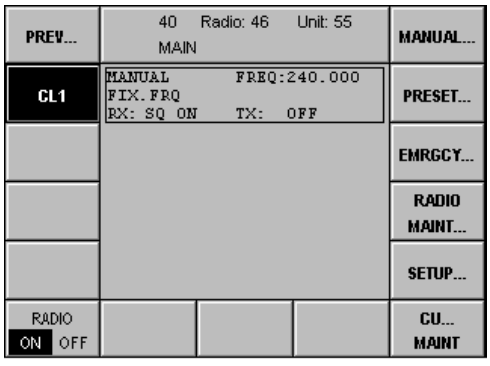
GB 4000C, mod. 03
Unit: 55

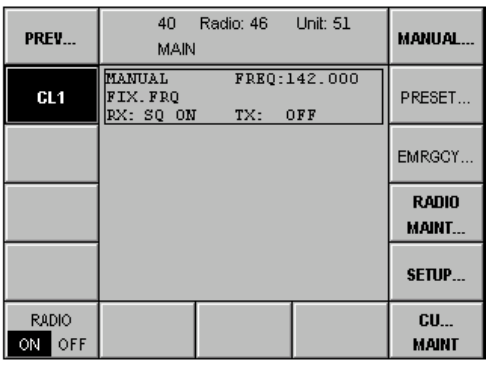
GB 4000C, mod. 02
Unit: 51

X. 4410A
Radio: 46

The M3SR Transceiver X. 4410A with local control unit (GB 4000C, mod. 02) may also be remote-controlled by a Control Unit GB 4000C, mod. 03.

GB 4000C, mod. 03 - Unit 55	GB 4000C, mod. 02 - Unit 51
Access level: advanced Control unit (55) controls transceiver with logical address 46 (ADR = own).	Access level: monitoring Control unit 51 can take control any time.
Detail of Menu 030:	Detail of Menu 030:
CL TYPE SESSION ADR 1 SIMPLE ADVCD own	CL TYPE SESSION ADR 1 SIMPLE ADVCD 55
The operator sees that his control unit (55) has advanced access level to the radio.	The operator sees that it is not his control unit (51) that has advanced access level to the radio, but control unit (55).
Menu 040:	Menu 040:





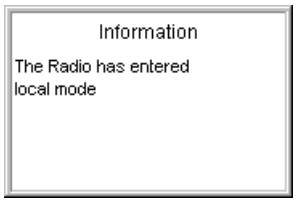
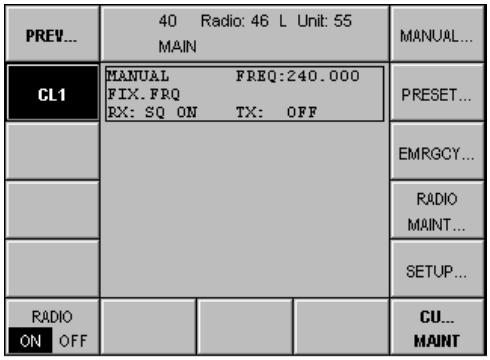
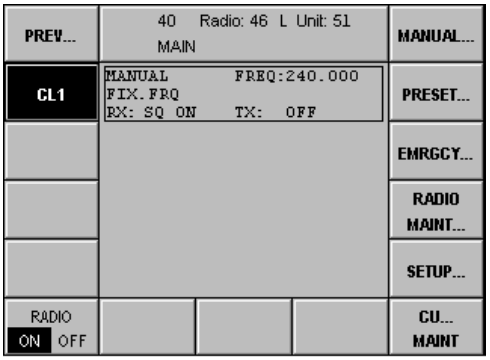
☞ Change access level to fixed

GB 4000C, mod. 03 - Unit 55	GB 4000C, mod. 02 - Unit 51
Access level is changed to fixed.	→ The following message comes up: 
Detail of Menu 030:	Detail of Menu 030:
CL TYPE SESSION ADR 1 SIMPLE FIXED own	CL TYPE SESSION ADR 1 SIMPLE FIXED 55
Control unit controls transceiver alone and cannot be interrupted.	When the operator tries to change the COM-LINE session, the following message comes up:
	

☞ Change access level to monitoring

GB 4000C, mod. 03 - Unit 55	GB 4000C, mod. 02 - Unit 51
Access level is changed to monitoring.	→ The following message comes up: 
Detail of Menu 030:	Detail of Menu 030:
CL TYPE SESSION ADR 1 SIMPLE own	CL TYPE SESSION ADR 1 SIMPLE 55
Control unit can take control any time.	Control unit can take control any time.

☞ Press LOCAL key.

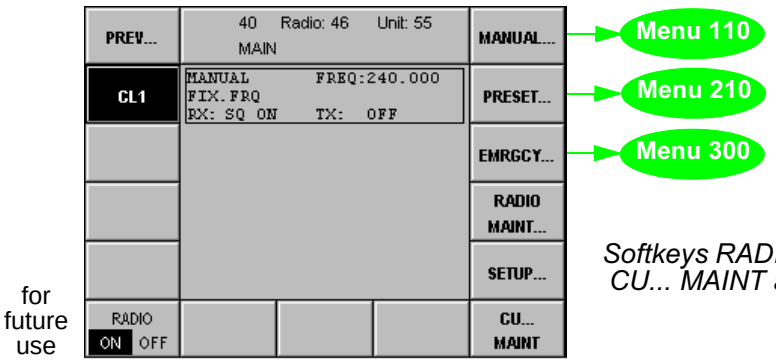
GB 4000C, mod. 03 - Unit 55	GB 4000C, mod. 02 - Unit 51
The following message comes up:	← The operator presses key LOCAL.
	
Only monitoring is possible.	Control unit controls transceiver in LOCAL mode.
Menu 040:	Menu 040:
	

2.5.5 Menu 040: MAIN

Starting point: Menu 040

If you come from any other menu,

☞ press key MENU HOME and the Menu 040 MAIN (HOME) appears:



for future use

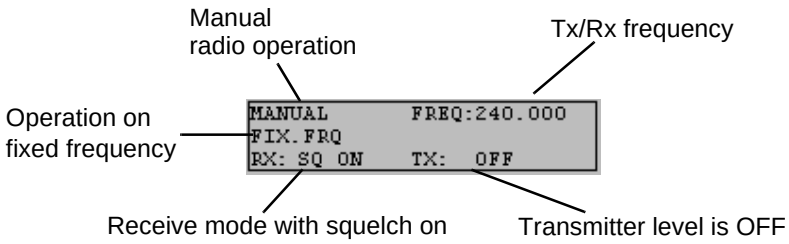
Note:

Softkeys RADIO MAINT..., SETUP... and CU... MAINT are dealt with in chapter 3.

Menu 040 shows the current operating status of the radio:

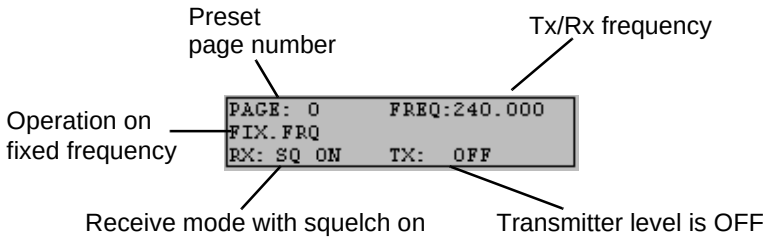
❑ The following settings are active:

Manual Mode:
Fixed Frequency

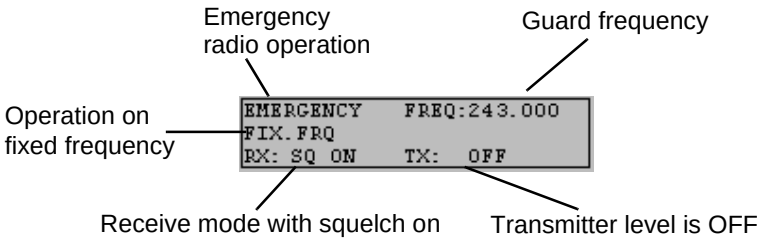


❑ Depending on the operation mode further displays are possible:

Preset Mode:
Fixed Frequency



Emergency Mode

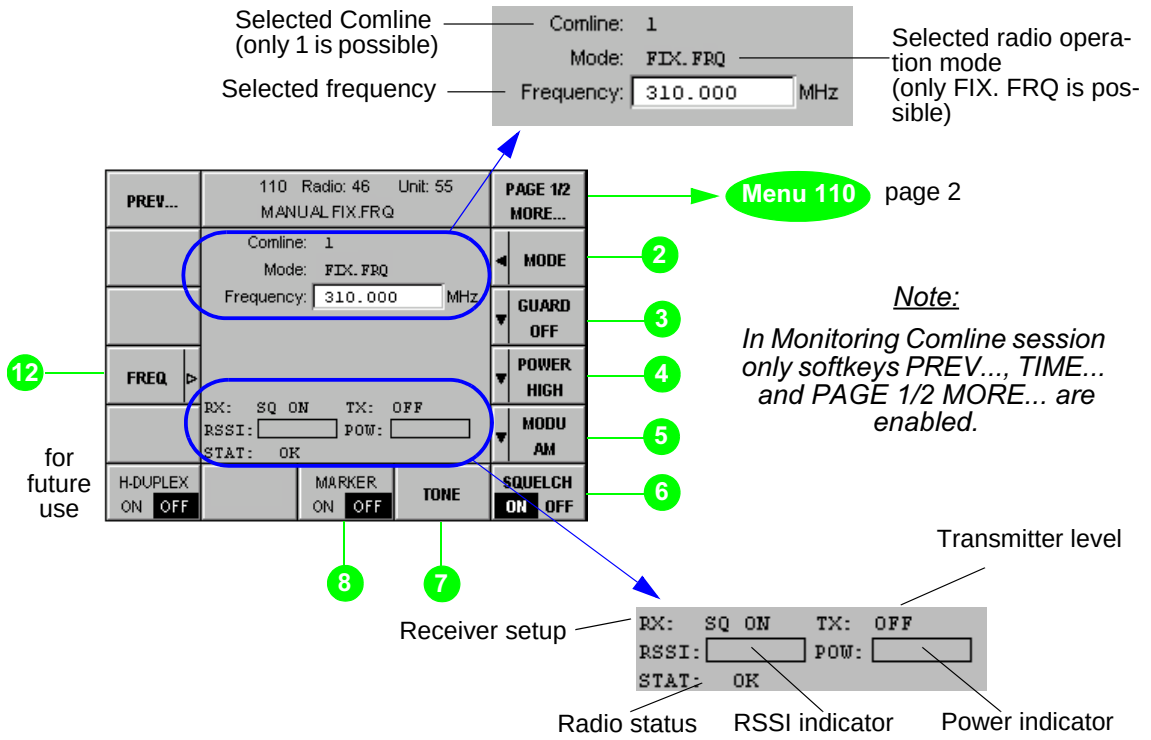


2.5.6 Menu 110, Page 1: MANUAL FIX. FRQ (Fixed Frequency)

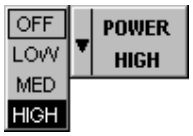
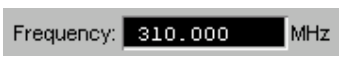
Menu 110 shows the current operating status of the radio. All operation parameters can be selected and edited by means of softkeys.

Starting point: Menu 040 (MAIN)

☞ Press softkey (1) [MANUAL...] and the following display appears:



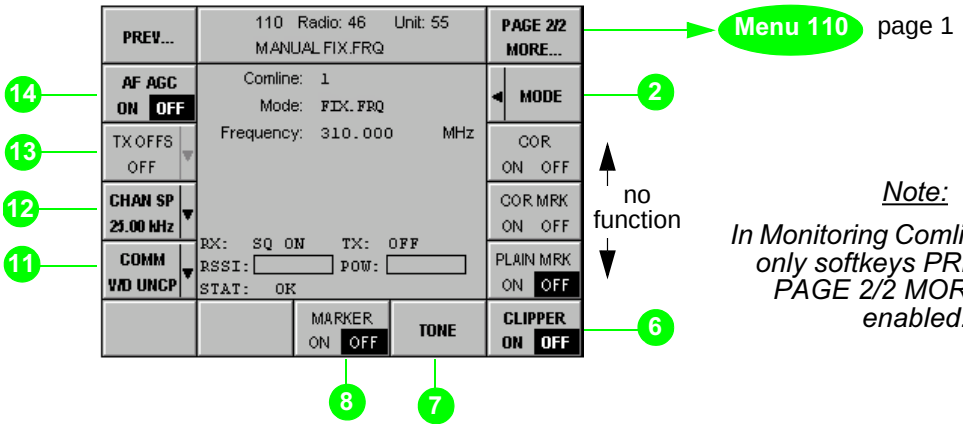
No.	Control	Action	Notes
2	FIX.FRQ / MODE	Press softkey MODE.	Selection of radio operating mode (only FIX. FRQ is possible) **FIX.FRQ:** The radio performs standard fixed-frequency transmission and reception, without frequency hopping.
3	OFF / UHF / VHF / UHF+VHF / GUARD OFF	Press softkey GUARD. Select setting.	Selection of the guard receiver AF signal that in communication mode V/D UNCP is to be mixed to the main receiver AF signal. **OFF:** mixer and LED SQL G switched off **UHF:** AF signal from guard receiver (UHF channel) **VHF:** AF signal from guard receiver (VHF channel) **UHF+VHF:** AF signals from guard receiver (UHF and/or VHF channel) Reception of an emergency call is indicated by illumination of the SQL G LED, as well as through a status message in the display.

No.	Control	Action	Notes
4		Press softkey POWER Select setting.	Selection of transmit power **OFF:** Tx is switched off **LOW:** Tx is set to low power **MEDIUM:** Tx is set to medium power **HIGH:** Tx is set to high power ➢ Exact levels in W are defined in Menu 516 (VU TX PARAMETERS).
5		Press softkey MODU. Select setting.	Selection of modulation type **AM:** amplitude modulation **FM:** frequency modulation
6		Press softkey SQUELCH.	Switches squelch function on or off. **OFF:** noise without Rx signal, no muting **ON:** Audio signal only if RF signal level is above squelch level ➢ The squelch level is set in Menu 515 (VU RX PARAMETERS).
7		Press softkey TONE.	Produces test tone (1 kHz) for test and monitoring purposes as long as softkey TONE is pressed. *Note:* *This tone is transmitted on the selected radio frequency.*
8		Press softkey MARKER.	Switches a marker tone on or off, if present. When a marker tone is present, the softkey automatically shows ON as the current setting. The marker tone is output via a loudspeaker or headset. By pressing this softkey the marker tone is switched off until the next one occurs.
12		Press softkey FREQ. Set value.	Setting of a common frequency for Tx and Rx operation in the frequency range from ❑ 100 to 512 MHz (VHF/UHF transceiver) or ❑ 108 to 173.9875 MHz (VHF transceiver) or ❑ 225 to 399.9875 MHz (UHF transceiver)  ➢ The stepwidth is selected in Menu 110, page 2 (MANUAL FIX.FRQ). *Note:* *The tuning knob setting needs no confirmation with ENT.*

2.5.7 Menu 110, Page 2: MANUAL FIX. FRQ (Fixed Frequency)

Starting point: Menu 110, page 1

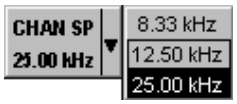
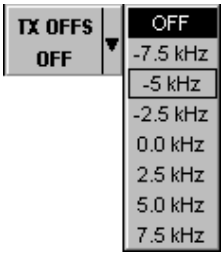
☞ Press softkey (1) **PAGE 1/2 MORE...** and the following display appears:



Note:

In Monitoring Comline session only softkeys PREV... and PAGE 2/2 MORE... are enabled.

No.	Control	Action	Notes
2	FIX.FRQ / MODE		See chapter 2.5.6, softkey 2.
6	CLIPPER ON OFF	Press softkey CLIPPER.	Switches clipper function on or off. (Noise reduction function only for receiver in AM mode) ➢ The CLIPPER level is selected in Menu 515 (VU RX PARAMETERS).
7	TONE		See chapter 2.5.6, softkey 7.
8	MARKER ON OFF		See chapter 2.5.6, softkey 8.
11	COMM V/D UNCP / V/D UNCP / WB ANALOG	Press softkey COMM. Select setting.	Example: Selection of a pre-defined communication mode, without device mapping (see also chapter 3): **V/D UNCP** Voice/Data unciphered (not encrypted) ● Audio line NB1 ● Keyline PTT_1L / PTT_2L **WB ANALOG** for wideband data transmission up to 16 kbps (baseband) ● Audio line WB2 ● Keyline PTT_1L / PTT_2L

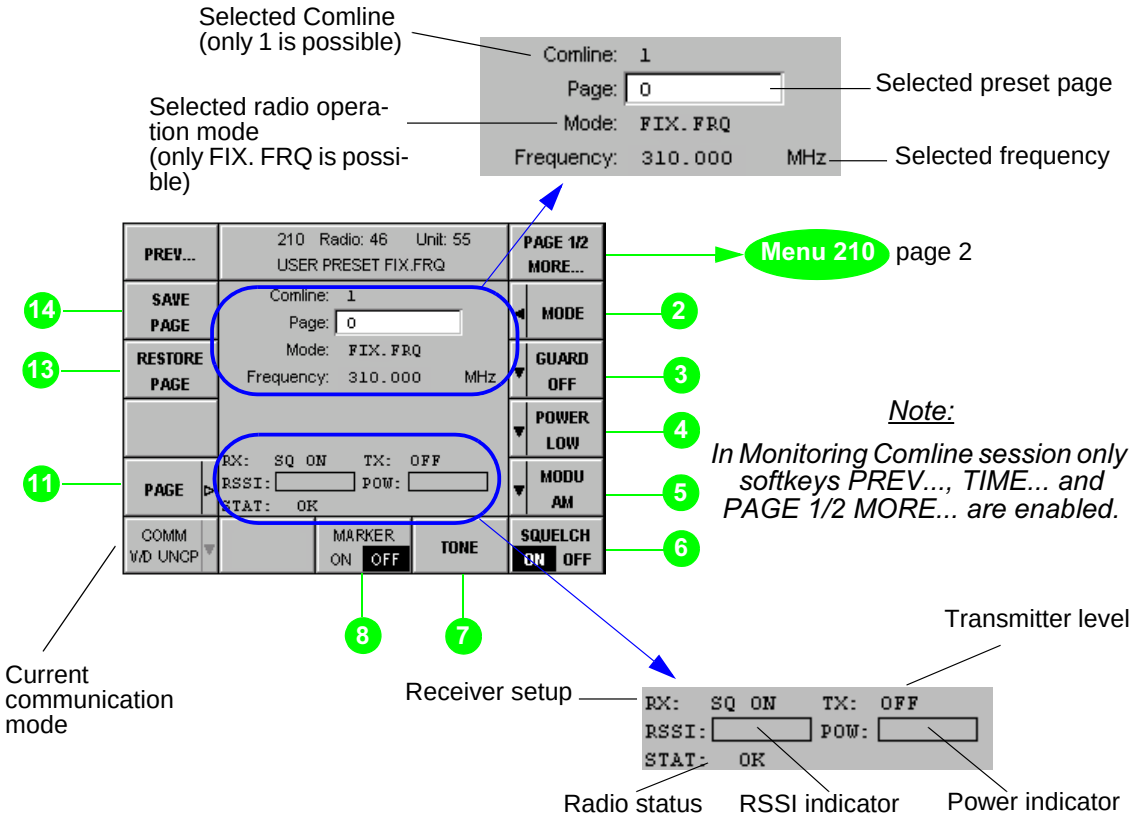
No.	Control	Action	Notes
12		Press softkey CHAN SP. Select value.	Selection of the channel spacing value The channel spacing of 8.33 kHz is only available in the frequency range from 118 MHz to 144 MHz. 8.33 kHz and 25 kHz are used for civil Air Traffic Control (ATC) in AM modulation. 25 kHz is standard in UHF band.
13		Press softkey TX OFFS. Select value.	Selection of the Tx offset value Tx offset is used for ATC purposes. Softkey TX OFFS is enabled in the frequency range from 118 MHz to 144 MHz. Tx offset is enabled with 25-kHz channel spacing. Tx offset selection is only available with AM modulation. <u>*Note:*</u> *Any change of the Tx offset will only take effect when the transmitter is next keyed.*
14		Press softkey AF AGC.	Switches AF AGC function on or off. The AGC controls the volume at the AF output for headphones and loudspeaker to a constant value. AGC = Automatic Gain Control (of audio frequency)

2.5.8 Menu 210, Page 1: USER PRESET FIX.FRQ (Fixed Frequency)

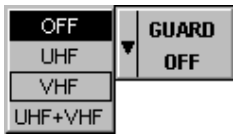
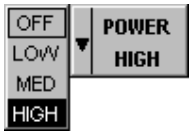
The PRESET menu is used for operation with the presettings stored in a PRESET PAGE. A few of the pre-defined values of the PRESET PAGE can also be edited and the new value can be stored.

Starting point: Menu 040 (MAIN)

☞ Press softkey (2) [PRESET...] and the following display appears:



No.	Control	Action	Notes
2	FIX.FRQ ◄ MODE	Press softkey MODE.	Selection of radio operating mode (only FIX. FRQ is possible) **FIX.FRQ:** The radio performs standard fixed-frequency transmission and reception, without frequency hopping.

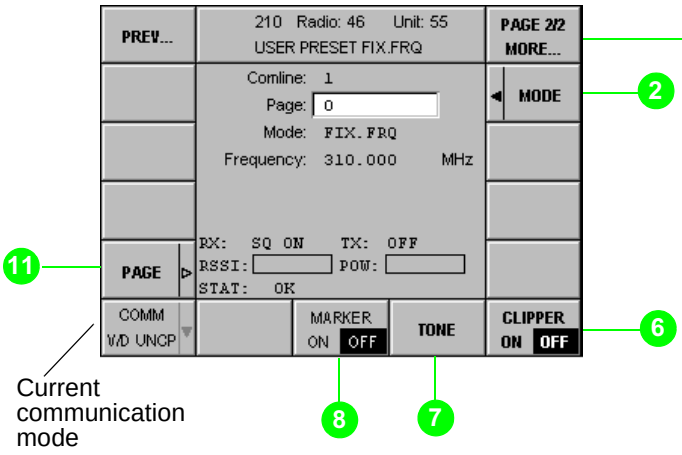
No.	Control	Action	Notes
3		Press softkey GUARD. Select setting.	Selection of the guard receiver AF signal that in communication mode V/D UNCP is to be mixed to the main receiver AF signal. **OFF:** mixer and LED SQL G switched off **UHF:** AF signal from guard receiver (UHF channel) **VHF:** AF signal from guard receiver (VHF channel) **UHF+VHF:** AF signals from guard receiver (UHF and/or VHF channel) Reception of an emergency call is indicated by illumination of the SQL G LED, as well as through a status message in the display.
4		Press softkey POWER. Select setting.	Selection of transmit power **OFF:** Tx is switched off **LOW:** Tx is set to low power **MEDIUM:** Tx is set to medium power **HIGH:** Tx is set to high power ➢ Exact levels in W are defined in Menu 516 (VU TX PARAMETERS).
5		Press softkey MODU. Select setting.	Selection of modulation type **AM:** amplitude modulation **FM:** frequency modulation
6		Press softkey SQUELCH.	Switches the squelch function on or off **OFF:** noise without Rx signal, no muting **ON:** Audio signal only if RF signal level is above squelch level ➢ The squelch level is set in Menu 515 (VU RX PARAMETERS).
7		Press softkey TONE.	Produces test tone (1 kHz) for test and monitoring purposes as long as softkey TONE is pressed. *Note:* *This tone is transmitted on the selected radio frequency.*
8		Press softkey MARKER.	Switches a marker tone on or off, if present. When a marker tone is present, the softkey automatically shows ON as the current setting. The marker tone is output via a loudspeaker or headset. By pressing this softkey the marker tone is switched off until the next one occurs.

No.	Control	Action	Notes
11	PAGE ▷	Press softkey PAGE. Set value.	The PAGE function is used to load a specific User Page into the Current Page range.  The range of values is determined in Menu 610 (PRESET CONFIGURATION). Preset count 1: 0 to 199 Preset count 2: 0 to 99 (preset = 1) Preset count 2: 0 to 99 (preset = 2) For definition of Current Page, User Page and Loaded Page see chapter 3.
13	RESTORE PAGE	Press softkey RESTORE PAGE.	RESTORE PAGE restores the originally Loaded Page in the User Page area. Simultaneously the Current page is updated also to the Loaded Page.
14	SAVE PAGE	Press softkey SAVE PAGE.	By using the SAVE PAGE key the content of the Current Page is stored in the User Page.  The asterisk signals that User Page and Loaded Page are no longer identical.

2.5.9 Menu 210, Page 2: USER PRESET FIX.FRQ (Fixed Frequency)

Starting point: Menu 210, page 1

☞ Press softkey (1) [PAGE 1/2 MORE...] and the following display appears:



Note:

In Monitoring Comline session only softkeys PREV... and PAGE 2/2 MORE... are enabled.

No.	Control	Action	Notes
2	FIX.FRQ / MODE		See chapter 2.5.8, softkey 2.
6	CLIPPER ON OFF	Press softkey CLIPPER.	Switches clipper function on or off. (Noise reduction function only for receiver in AM mode) ➢ The CLIPPER level is selected in Menu 515 (VU RX PARAMETERS).
7	TONE		See chapter 2.5.8, softkey 7.
8	MARKER ON OFF		See chapter 2.5.8, softkey 8.
11	PAGE		See chapter 2.5.8, softkey 11.

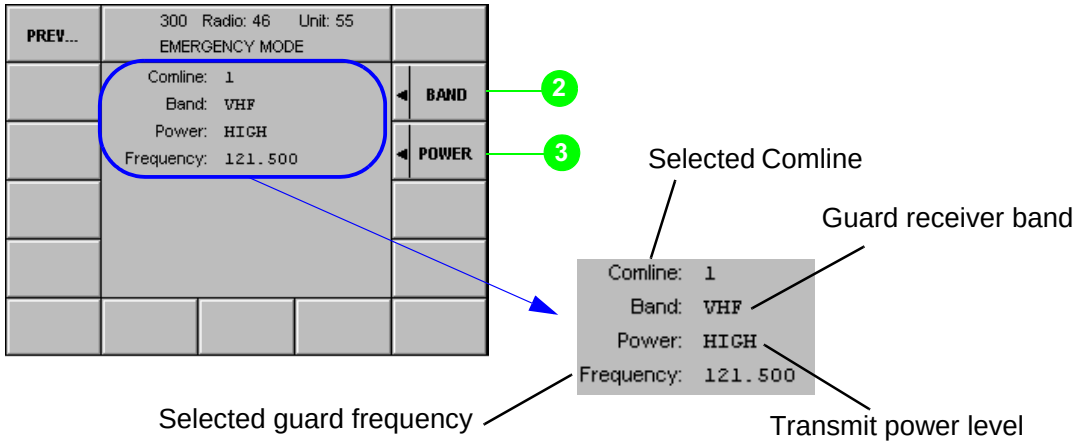
2.5.10 Menu 300: EMERGENCY MODE

In the EMERGENCY menu, frequency band and transmit power for making an emergency call can be selected. Reception of an emergency call is indicated by illumination of the SQL G LED, as well as through a status message in the display. When the operator then changes to the EMERGENCY menu, that frequency where the call was received on will be automatically set. Then the operator only has to press the PTT key to answer the emergency call. Depending on the configuration in Menu 575 (FRONTPANEL AUDIO SOURCE), the emergency call will also be made audible via the loudspeaker. Softkey GUARD (see Menu 110, page 1 (MANUAL FIX.FRQ) and Menu 210, page 1 (USER PRESET FIX.FRQ)) is used to select the guard receiver AF signal that in communication mode V/D UNCP is to be mixed to the main receiver AF signal on the Comline.

Starting point: Menu 040 (MAIN)

☞ Press softkey (3) [EMRGCY...]

❑ The following display appears:



No.	Control	Action	Notes
2	UHF / VHF ◄ BAND	Press softkey BAND to select the required band.	Tunes to emergency frequency of transmitter (VHF or UHF): VHF = 121.500 MHz UHF = 243.000 MHz *Note:* *When the radio receives an emergency call e.g. on 121.500 MHz and the operator then changes to Menu 300, the frequency of 121.500 MHz will be tuned automatically. However, if the operator still wants to select 243.000 MHz, then he only needs to press softkey BAND.*
3	OFF / LOW / MED / HIGH ▼ POWER HIGH	Press softkey POWER to select the required power level.	Selection of emergency transmit power **OFF:** Tx is switched off **LOW:** Tx is set to low power **MEDIUM:** Tx is set to medium power **HIGH:** Tx is set to high power ➢ The exact levels in W are set in Menu 516 (VU TX PARAMETERS).

	Function	Communication Mode					
		Voice / Data Unciphered	Voice / Data Ciphered	Wideband Analog	Wideband Digital Diphase	Wideband Digital Baseband	Link 11
Rx	Squelch	x	---	---	---	---	---
	Muting	x	---	---	---	---	x
	X26.13	x	x	x	x	x	n / a
Rx	Guard	x	x [3]	x [3]	x [3]	x [3]	x [5]
Rx	AF AGC	x [1]	---	---	---	---	---
Rx	Clipper	x [1]	---	---	---	---	---
Rx/Tx	Frequency in MHz	XU: 100 ≤ f < 174 XD: 225 ≤ f < 400 XT: 100 ≤ f ≤ 512	XU: 100 ≤ f < 174 XD: 225 ≤ f < 400 XT: 100 ≤ f ≤ 512	XU: 100 ≤ f < 174 XD: 225 ≤ f < 400 XT: 100 ≤ f ≤ 512	XU: 100 ≤ f < 174 XD: 225 ≤ f < 400 XT: 100 ≤ f ≤ 512	XU: 100 ≤ f < 174 XD: 225 ≤ f < 400 XT: 100 ≤ f ≤ 512	XD = XT: 225 ≤ f < 400
Rx/Tx	Modulation (AM / FM)	x	x	x	x	x	FM
Rx/Tx	Channel Spacing in kHz	8.33 [2] 12.5 25.0	12.5 25.0	12.5 25.00	12.5 25.0	12.5 25.0	25.0
Tx	Power	x	x	x	x	x	x
Tx	Tone	x	---	---	---	---	---
Tx	TX Offset	x [4]	---	---	---	---	---

[1] only AM

[2] only AM and 118 ≤ f ≤ 144 MHz

[3] A separate audio line (e.g. NB2) needs to be configured in Menu 560 (AUDIO MAPPING)

[4] only with 25-kHz channel spacing

[5] A separate audio line (NB1) needs to be configured in Menu 560 (AUDIO MAPPING). Please note that in this case the AF1 interface cannot be used any more for voice modes.

Fig. 2.2 Functions Related to the Communication Mode (Rx, Rx/Tx, Tx)

WELCOME		000 SYSTEM			
010 CONNECT					
020 COMLINE SESSION	030 RADIO SESSION				
040 MAIN/MENU HOME		100 MANUAL		110 MANUAL FIX.FRQ (fixed frequency)	
		200 PRESET		210 USER PRESET FIX.FRQ (fixed frequency)	
		300 EMERGENCY			
		400 RADIO MAINTENANCE	Page 1/2	405 RADIO IBIT RESULTS	406 RADIO IBIT DETAILS
				410 RADIO CBIT RESULTS	411 RADIO CBIT DETAILS
				415 RADIO INVENTORY	416 RADIO INVENTORY DETAILS
				420 RADIO ERROR LIST	421 RADIO ERROR DETAILS
				425 RADIO CONTROL PORT	
				435 RADIO ADDRESS LIST	436 RADIO ADDRESS ROUTE
				440 RADIO TIME	
			Page 2/2	505 RADIO OPTIONS	506 SET OPTIONS
				510 RADIO MODULES	511 PLATFORM PARAMETERS
					512 AFI PARAMETERS
					515 VU RX PARAMETERS
					516 VU TX PARAMETERS
					517 VU SYNT PARAMETERS
				535 SPLIT SITE DEFINITION	
				550 PTT COMLINE MAPPING	
				560 AUDIO MAPPING	
				565 DEVICE MAPPING	
				570 SQUELCH POLARITY	
				575 FRONTPANEL AUDIO SOURCE	
				580 MARKER CONTROL	
		600 RADIO SETUP		610 PRESET CONFIGURATION	
				620 LOADED PRESET PAGE PARAMS	710 EDIT PRESET PAGE FIX.FRQ
		800 CU MAINTENANCE		805 CU IBIT RESULTS	806 CU IBIT DETAILS
				807 KEYBOARD TEST	
				810 CU CBIT RESULTS	811 CU CBIT DETAILS
				815 CU INVENTORY	816 CU INVENTORY DETAILS
				820 CU ERROR LIST	821 CU ERROR DETAILS
				835 CU ADDRESS LIST	836 CU ADDRESS ROUTE
				840 DISPLAY PARAMS	

Fig. 2.3 M3SR Transceiver X. 4410A / X. 4460A, Menu Overview

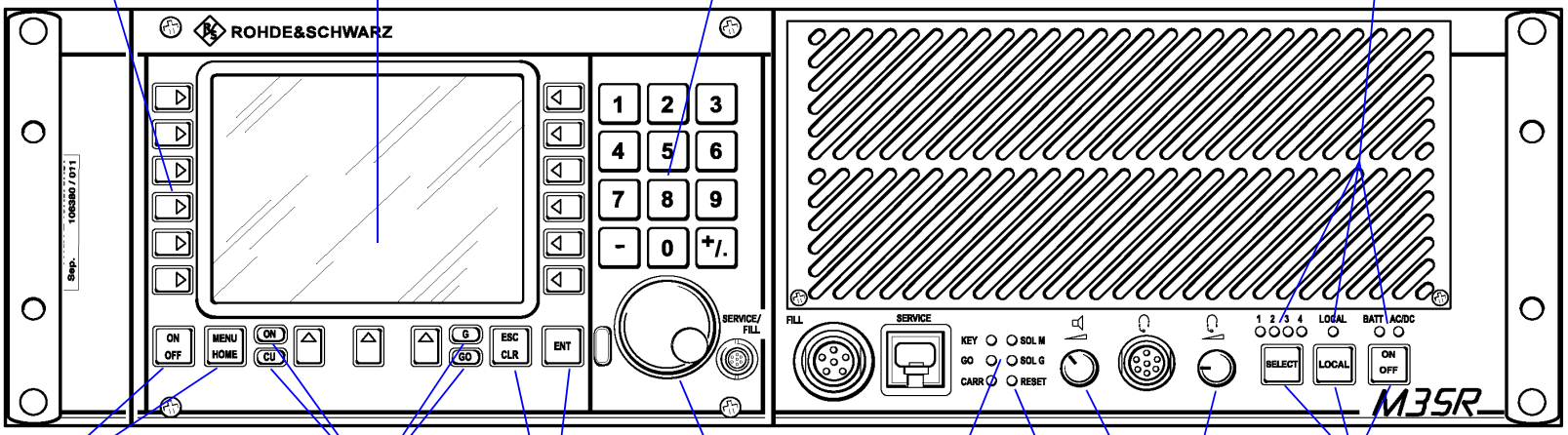
Softkeys:
Selecting menu-dependent functions

Display:
- Display of menus
- Display of menu-dependent softkey functions

Numerical keypad:
Input of
- Numerical values
- Decimal point

Key + / -
- Incrementing or decrementing selection

LED on:
1 to 4
Communication line selected (2 to 4 disabled)
LOCAL
Local operation selected
BATT
Battery operation
AC / DC
AC / DC operation



Keys:
ON / OFF
- ON: switching radio ON
- OFF: switching only control unit off

MENU HOME
Switching to start menu 040

LED on:
ON
Control unit is on
CU
Control unit ok
G
Squelch guard receiver active
GO
Radio ok

Keys:
ENT
- Confirming entries
- Initiating processes

ESC CLR
- Deleting entries
- Aborting processes

Tuning knob:
- Tuning values
- Selecting menus

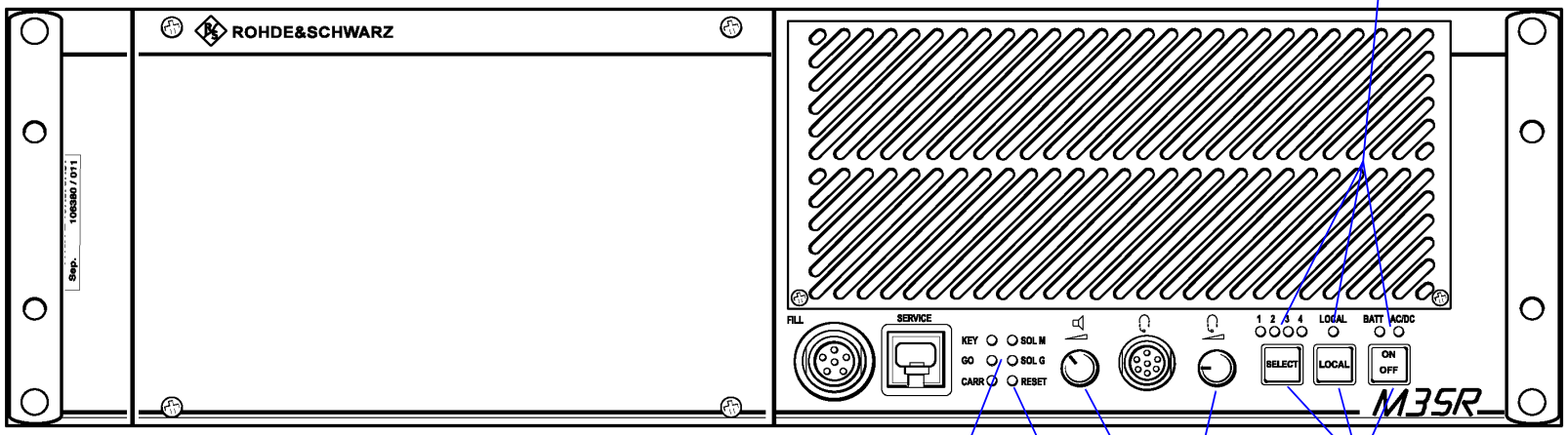
LED on:
KEY
Key system on
GO
Radio ok
CARR
Carrier activated
SQL M
Squelch main receiver active
SQLG
Squelch guard receiver active

RESET button:
Resetting the trans-ceiver

Loudspeaker / headphone volume control:
Low volume
Control turned fully counter-clockwise
Full volume
Control turned fully clockwise

Keys:
SELECT
Selecting communication line 1 (2 to 4 disabled) = Rx and / or GRx signal
LOCAL
Selecting local / remote operation (toggle function)
ON / OFF
Switching transceiver on or off (toggle function)

Fig. 2.4 M3SR Transceiver X. 4410A, Control and Display Elements



LED on:

1 to 4

Communication line selected (2 to 4 disabled)

LOCAL

Local operation selected

BATT

Battery operation

AC / DC

AC / DC operation

RESET button:

Resetting the transceiver

Keys:

SELECT

Selecting communication line 1 (2 to 4 disabled) = Rx and / or GRx signal

LOCAL

no function

ON / OFF

Switching transceiver on or off (toggle function)

LED on:

KEY

Key system on

GO

Radio ok

CARR

Carrier activated

SQL M

Squelch main receiver active

SQL G

Squelch guard receiver active

Loudspeaker / headphone volume control:

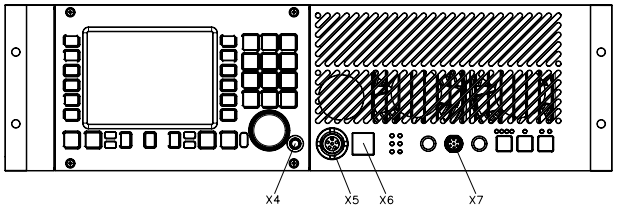
Low volume

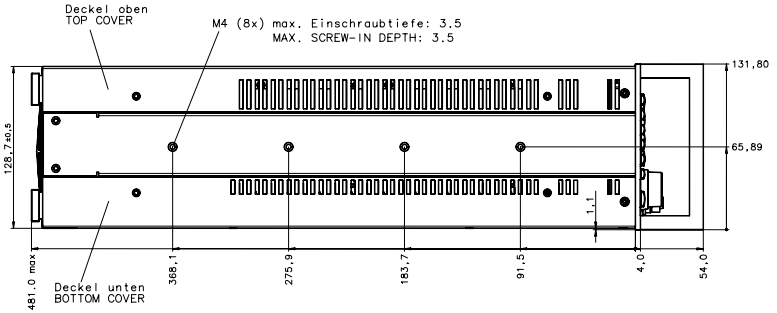
Control turned fully counter-clockwise

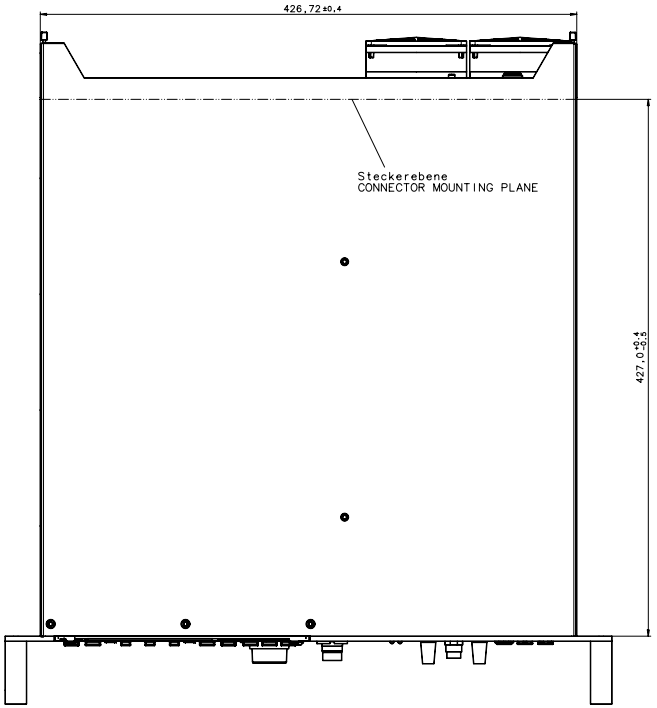
Full volume

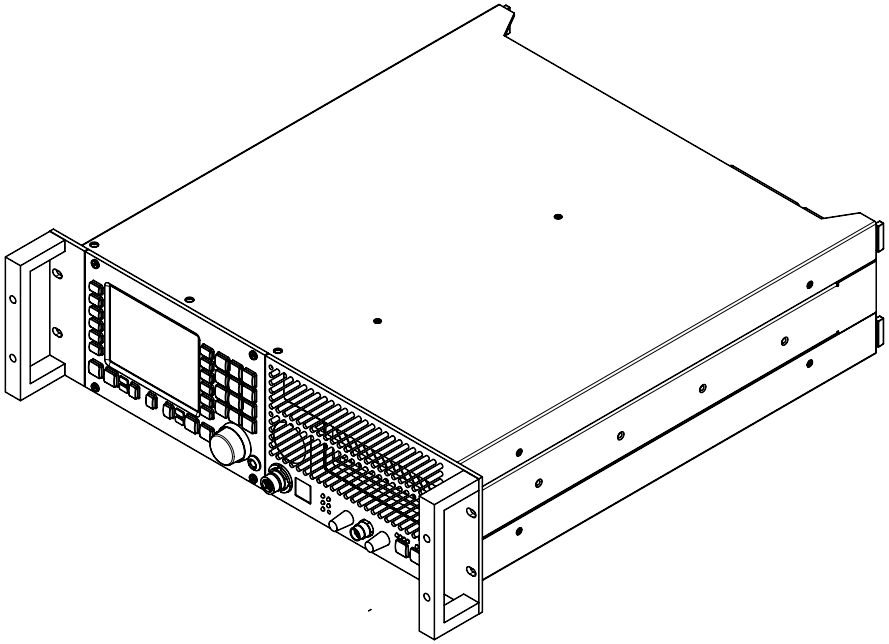
Control turned fully clockwise

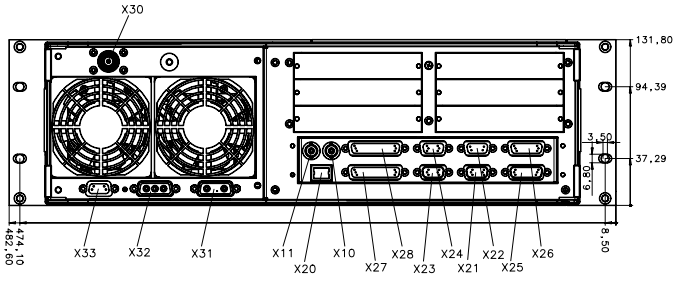
Fig. 2.5 M3SR Transceiver X. 4460A, Control and Display Elements











Steckerlage siehe Schnittstellen-
beschreibung der Module.

FOR CONNECTOR POSITION SEE INTERFACE
DESCRIPTION OF INDIVIDUAL MODULES.

Projektions-
methode
Projection
Method

Maßstab / Scale 1:2	Toleranz / Tol. +-0,3	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation M3SR ANLAGEN-DOKU M3SR SYSTEM DOCU		Sprache / Lang. de en	Rel. / C.I. 01.00	Blatt / Sh. 1
Typ / Type				Zeichn.-Nr. / Drawing No. 6102.4002.01	DF
Ers. f. / Repl. for	Datum / Date 20.06.2001	Abteilung / Dept. 2GEM	Name SN		

3. Use under Special Conditions

Note:

All settings are to be carried out by qualified personal (system administrator) only.

3.1 Introduction

This chapter provides information concerning

- ❑ Introduction to Communication Modes, Resources and External Devices
- ❑ Configuration Examples
  - Voice / Data Unciphered
  - Wideband Analog
  - Wideband Digital
  - Link 11 (CLEW)
  - Voice / Data Ciphered
- ❑ Guard Receiver
- ❑ Preset Pages
- ❑ PIN Numbers
- ❑ Configuration
  - Menu SYSTEM
  - Menu RADIO SESSION
  - Menu RADIO MAINTENANCE
  - Menu Radio SETUP
  - Menu CU MAINTENANCE

3.2 Introduction to Communication Modes, Resources and External Devices

The following diagram illustrates the relationship between Option Codes, Radio Modes, External Devices, Resources and Communication Modes:

- Option Codes: code to select functionality of radio software
- Radio Modes: type of radio communication
- Communication Mode: method for voice/data transmission
- Resources: audio and PTT interfaces between radio and external devices
- External Devices: type of data terminal equipment that can be connected at the audio interface
- Comline: interface between Rx / Tx functional unit (radio modules) and resources.

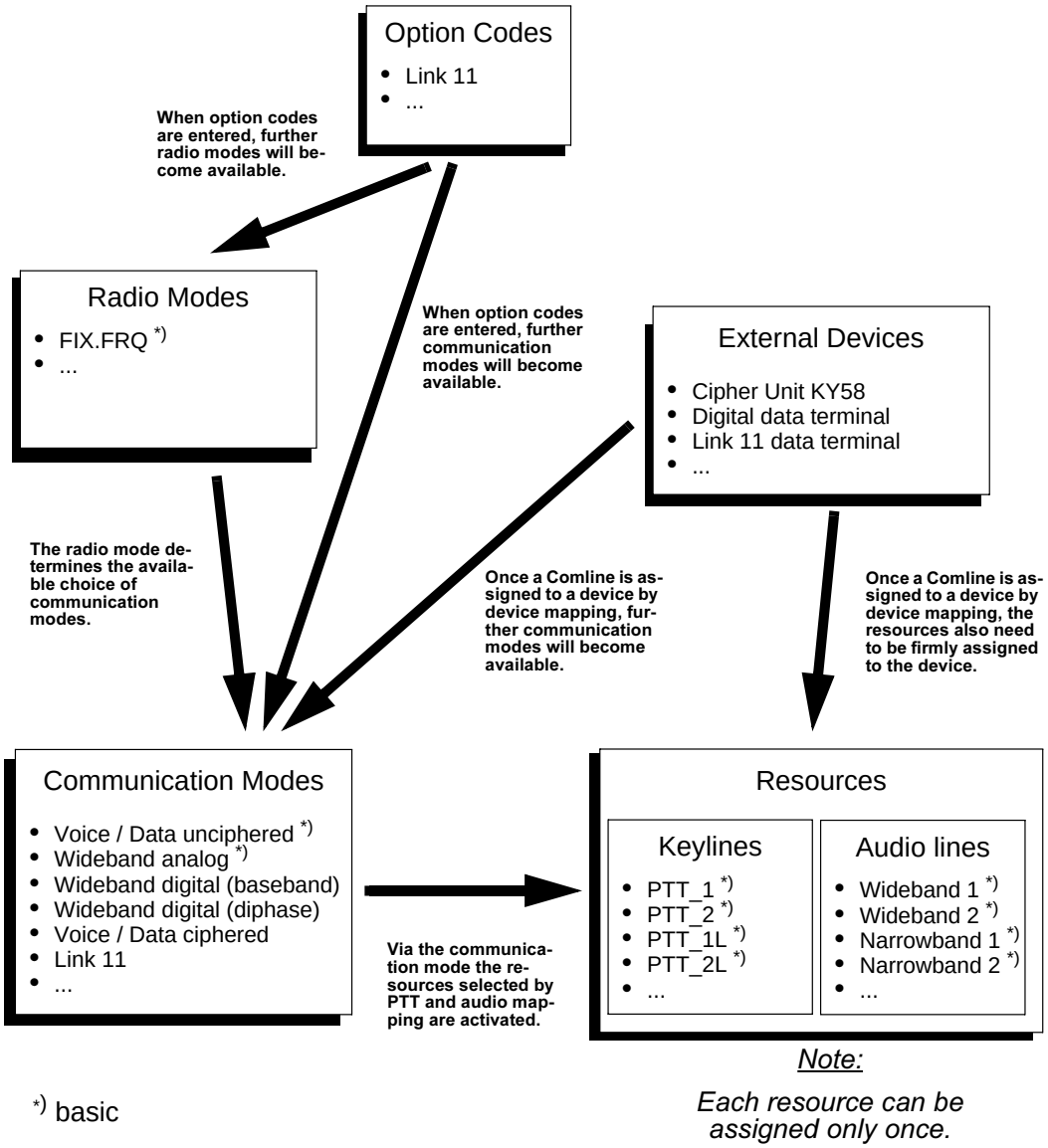


Fig. 3.1 Overview

3.2.1 Communication Modes

Depending on the option codes, the external devices connected at the Comline and the currently active radio mode, one or several of the following communication modes are available:

- ❑ Voice / Data Unciphered (V/D UNCP):

  The communication mode V/D UNCP is used for narrowband AM and FM voice communication. The keyline selected by PTT mapping is used. Narrowband audio lines NB1 and NB2 are available. Audio line NB1 should be used by preference.

- ❑ Wideband Analog (WB ANALOG)

  The communication mode WB ANALOG is used for wideband AM and FM communication with analog data terminals (only baseband). The keyline selected by PTT mapping is used. Wideband audio lines WB1 and WB2 are available. Audio line WB2 should be used by preference.

- ❑ Wideband Digital Baseband (WB DIGITAL BB) and
  Wideband Digital Diphase (WB DIGTAL DP)

  The communication modes WB DIGITAL are used for data communication (ASK, FSK) with digital data terminals (baseband and diphase). Carrier activation for transmission is carried out via keyline PTT_1, and the digital data are transmitted via wideband audio line WB1.

- ❑ Link 11 (LINK 11)

  The communication mode LINK 11 is used for data communication with Link 11 data terminals. Carrier activation for transmission is carried out via keyline PTT_2, and the data are transmitted via narrowband audio line NB2.

- ❑ Voice / Data Ciphered (V/D CP)

  The voice encrypted by Cipher Unit KY 58 is transmitted via wideband audio line WB1. Carrier activation for transmission is carried out via keyline PTT_1L. The KY 58 and the M3SR Transceiver are interconnected via the following signals:

  - CGC (cipher ground control)
  - DPTT (delayed PTT)
  - PT/CT (plain text / cipher text)
  - BB/DP (baseband / diphase)
  - ZEROIZE

The following table illustrates how the radio operation mode is related to the communication mode:

Radio operation mode	Communication mode					
	V/D UNCP	WB ANALOG	WB DIGITAL BB	WB DIGITAL DP	LINK11	V/D CP
FIX.FRQ	x	x	x	x	x	x

Note:

When changing to a different communication mode, e.g. in Menu 110 (MANUAL FIX.FRQ), further parameters may be changed automatically. When changing from Voice / Data Unciphered (modulation mode AM, channel spacing 12.5 kHz) to Link 11, modulation mode FM and channel spacing of 25 kHz will be set. However, changing back to Voice / Data Unciphered will not re-establish the initial settings of modulation mode and channel spacing.

3.2.2 Resources

The Audio Frequency Interface (part of Radio Basis KR 4400) provides the following resources:

- ❑ four keylines
  - PTT_1L (contact X26.10)
  - PTT_1 (contact X26.18)
  - PTT_2L (contact X25.10)
  - PTT_2 (contact X25.18)
- ❑ four audio lines (narrowband, wideband)
  - NB1 (contacts: Tx = X26.1 and .2; Rx = X26.3 and .4)
  - NB2 (contacts: Tx = X25.1 and .2; Rx = X25.3 and .4)
  - WB1 (contacts: Tx = X26.6 and .7; Rx = X26.8 and .9)
  - WB2 (contacts: Tx = X25.6 and .7; Rx = X25.8 and .9)

Resources are activated in Menu 550 (PTT COMLINE MAPPING) for keylines and in Menu 560 (AUDIO MAPPING) for audio lines. Please note that each resource can be assigned only once. That means that if for instance the resource PTT 1L is assigned to device A, it cannot be assigned to device B at the same time.

Keylines may also be defined to be low or high-active.

3.2.3 External Devices

A great variety of external devices may be connected to the M3SR Transceiver. This also includes cipher units, digital and Link 11 data terminals. Before external devices can be used, however, each of them needs to be connected to the Comline. This is done in Menu 565 (DEVICE MAPPING). A Comline is a group of modules within the radio (see also Menu 510 (RADIO MODULES)). Once the device is linked to the Comline, further communication modes are available for use (see table below).

External Device	Comline	Communication mode					
		V/D UNCP	WB ANALOG	WB DIGITAL BB	WB DIGITAL DP	LINK11	V/D CP
no external device required	CL1	x	x				
Cipher Unit KY58	CL1	x	x				x
Link 11 data terminal	CL1	x	x			x	
Digital data terminal	CL1	x	x	x	x		

For the basic communication modes V/D UNCP and WB ANALOG, device mapping is not implemented. Resources are assigned via Menus 550 (PTT COMLINE MAPPING) and 560 (PTT MAPPING).

Resource assignment to a device connected to the Comline is carried out automatically (see table below).

Communication Mode	Comline	Keylines				Audio Lines				External Device Mapping
		PLL_1L	PTT_1	PTT_2L	PTT_2	NB1	WB1	NB2	WB2	
V/D UNCP	CL1	according to PTT Mapping				x		x		
V/D UNCP	CL1	x				x				**Cipher unit**
V/D CP							x			
WB ANALOG	CL1	according to PTT Mapping					x		x	**no mapping**
WB DIGITAL BB	CL1		x				x			**Digital data terminal**
WB DIGITAL DP	CL1		x				x			
LINK 11	CL1				x			x		**Link 11 data terminal**

Consequently, not all resources are available for the basic communication modes V/D UNCP and WB ANALOG. The table shows that simultaneous connection of a cipher unit and a digital modem (SYNC WB DATA) is impossible because both devices need resource WB1.

Once the external devices are linked to the Comline, the operator can select the communication mode he wants to communicate in by pressing softkey COMM in Menu 110, page 2 (MANUAL FIX.FRQ).

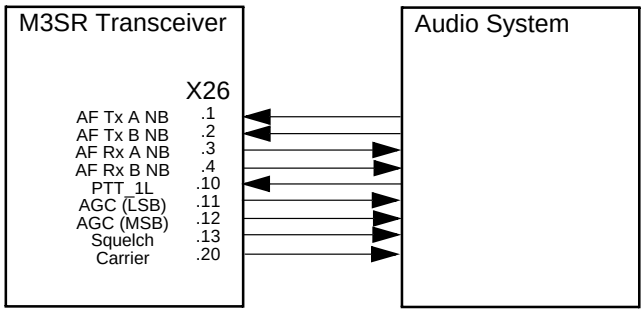
3.3 Configuration Examples

3.3.1 Voice / Data Unciphered

Note:

No device has been linked to the Comline in Menu 565 (DEVICE MAPPING).

Voice transmission shall take place via narrowband audio line NB1 and carrier activation via keyline PTT_1L (low-active). Modulation is in AM or FM.



Communication Mode	Comline	Keylines				Audio Lines				External Device
		PLL_1L	PTT_1	PTT_2L	PTT_2	NB1	WB1	NB2	WB2	
V/D UNCP	CL1	x				**x**				

Starting point: Menu 040 (MAIN)

1. Press softkey [RADIO MAINT...]

Menu 400 (RADIO MAINTENANCE)

2. Enter maintenance PIN by using the numerical keypad, then press ENTER.

3. Press softkeys [PAGE 1/2 MORE...] [AUDIO MAPPING...]

Menu 560 (AUDIO MAPPING)

4. Select audio lines NB1 by using the tuning knob.

5. Press softkey [◄ SOURCE]

6. Select source CL1 by using the tuning knob, then press ENTER.

7. Press softkeys [SAVE *] [PTT MAPPING...]

Menu 550 (PTT COMLINE MAPPING)

8. Select keyline PTT_1L by using the tuning knob.

9. Press softkey [◄ CL]

10. Select Comline CL1 by using the tuning knob, then press ENTER.

11. Press softkey [◄ ACTIVE] to set the PTT level to low.

12. Press softkeys

Menu 570 (SQUELCH POLARITY)

13. Select squelch SQ COMLINE 1 by using the tuning knob.

14. Press softkey 

to set the squelch level to low.

15. Press softkeys 

Menu 575 (FRONTPANEL AUDIO SOURCE)

16. Select audio source 1 by using the tuning knob.

17. Press softkey 

18. Select source CL1 by using the tuning knob.

19. Press softkeys 

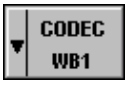
Menu 510 (RADIO MODULES)

20. Press softkey 

21. Select module audio interface by using the tuning knob.

22. Press softkey 

Menu 512 (AFI PARAMETERS)

23. Press softkey 

24. Select audio line NB1 by using the tuning knob.

25. Press softkey 

26. Enter a new TX LEVEL by using the numerical keypad, then press ENTER.

Range: -15 dB to 0 dB, if TX-ALC = ON

27. Press softkey 

28. Enter a new RX LEVEL by using the numerical keypad, then press ENTER.

Range: -20 dB to +10 dB

29. Press softkey 

30. Enter a new TX ALC ATTACK time by using the numerical keypad, then press ENTER.

Range: 10 ms to 100 ms; 30 ms recommended

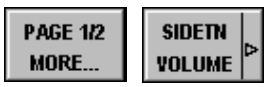
31. Press softkey 

32. Enter a new TX ALC DECAY time by using the numerical keypad, then press ENTER.

Range: 100 ms to 2 000 ms; 300 ms recommended

33. Press softkey 

to switch on the automatic level control.

34. Press softkeys 

35. Enter a new value for SIDETONE VOLUME by using the numerical keypad, then press ENTER.

Range: -25.5 dB to 0 dB relative to selected audio Rx level

36. Press softkey 

37. Select module VU POWER AMPLIFIER by using the tuning knob.

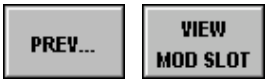
38. Press softkey 

Menu 516 (VU TX PARAMETERS)

39. Press softkey 

40. Enter a new modulation depth by using the numerical keypad, then press ENTER.

Range: 10% to 99%; 90% recommended

41. Press softkeys 

42. Select module VU RX (receiver) by using the tuning knob.

43. Press softkey 

Menu 515 (VU RX PARAMETERS)

44. Press softkey 

45. Select a new AF AGC ATTACK time by using the tuning knob, then press ENTER.

46. Press softkey 

47. Select a new AF AGC DECAY time by using the tuning knob, then press ENTER.

48. Press softkey 

49. Enter a new threshold by using the numerical keypad, then press ENTER.

Range: 6 dB to 20 dB

50. Press softkey 

51. Select a new clipper level by using the tuning knob, then press ENTER.

52. Press softkey 

53. Select module VU SYN (synthesizer) by using the tuning knob.

54. Press softkey 

Menu 517 (VU SYN PARAMETERS)

55. Press softkey 

56. Enter a new value for TX Deviation (FM, narrowband) by using the numerical keypad, then press ENTER.

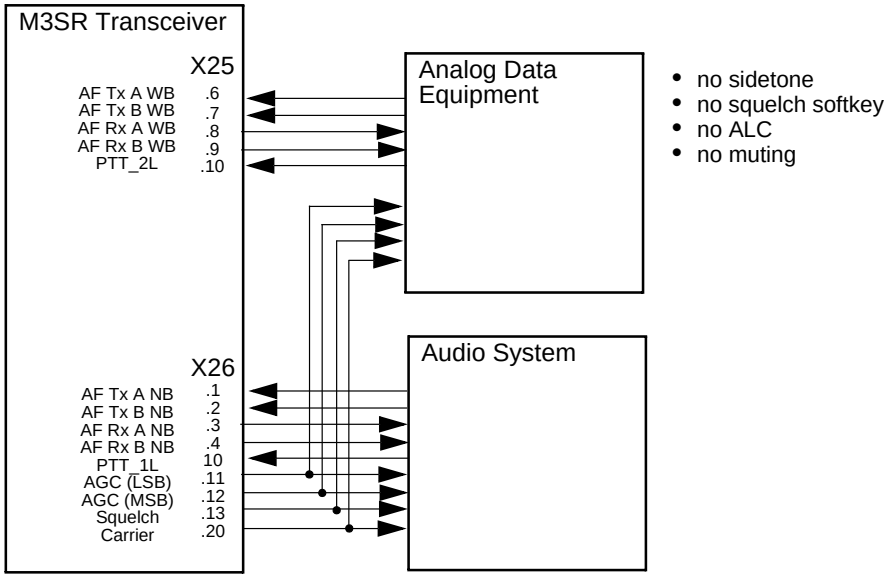
Range: 1 kHz to 20 kHz;
3.5 kHz recommended

3.3.2 Wideband Analog

Note:

No device has been linked to the Comline in Menu 565 (DEVICE MAPPING).

Voice transmission is to take place via narrowband audio line NB1 and carrier activation via keyline PTT_1L (low-active). Modulation is in AM or FM (see chapter 3.3.1). In addition, an analog data equipment is connected. Data transmission is to be carried out via wideband audio line WB2 and carrier activation via keyline PTT_2L (low-active). Modulation is in AM or FM.



Communication Mode	Comline	Keylines				Audio Lines				External Device Mapping
		PLL_1L	PTT_1	PTT_2L	PTT_2	NB1	WB1	NB2	WB2	
V/D UNCP	CL1	x				**x**				
WB ANALOG	CL1			**x**					**x**	**no mapping**

Starting point: Menu 040 (MAIN)

1. Press softkey [RADIO MAINT...]

Menu 400 (RADIO MAINTENANCE)

2. Enter maintenance PIN by using the numerical keypad, then press ENTER.
3. Press softkeys [PAGE 1/2 MORE...] [AUDIO MAPPING...]

Menu 560 (AUDIO MAPPING)

4. Select audio lines WB2 by using the tuning knob.
5. Press softkey [◄ SOURCE]
6. Select source CL1 by using the tuning knob, then press ENTER.
7. Press softkeys [SAVE *] [PTT MAPPING...]

Menu 550 (PTT COMLINE MAPPING)

8. Select keyline PTT_2L by using the tuning knob.
9. Press softkey [◄ CL]

10. Select Comline CL1 by using the tuning knob, then press ENTER.
11. Press softkey 

to set the PTT level to low.
12. Press softkeys

Menu 570 (SQUELCH POLARITY)

13. Select squelch SQ COMLINE 1 by using the tuning knob.
14. Press softkey 

to set the squelch level to low.
15. Press softkeys 

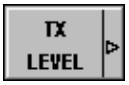
Menu 510 (RADIO MODULES)

16. Press softkey 

17. Select module audio interface by using the tuning knob.
18. Press softkey 

Menu 512 (AFI PARAMETERS)

19. Press softkey 

20. Select audio line WB2 by using the tuning knob.
21. Press softkey 

22. Enter a new TX LEVEL by using the numerical keypad, then press ENTER.

Range: -3 dB to +15.5 dB
relative to 1.4 V_{pp}

0 dB	=	1.4 V_{pp} into 600 Ω
-3 dB	=	1.0 V_{pp} into 600 Ω
+15.5 dB	=	8.0 V_{pp} into 600 Ω

23. Press softkey 

24. Enter a new RX LEVEL according to step 22.
25. Press softkey 

26. Select module VU POWER AMPLIFIER by using the tuning knob.
27. Press softkey 

Menu 516 (VU TX PARAMETERS)

28. Press softkey 

29. Enter a new modulation depth by using the numerical keypad, then press ENTER.

Range: 10% to 99%; 90% recommended

Note:
Frequency range = 30 Hz to 12 kHz

30. Press softkey 

31. Select module VU SYN (synthesizer) by using the tuning knob.
32. Press softkey 

Menu 517 (VU SYN PARAMETERS)

33. Press softkey 

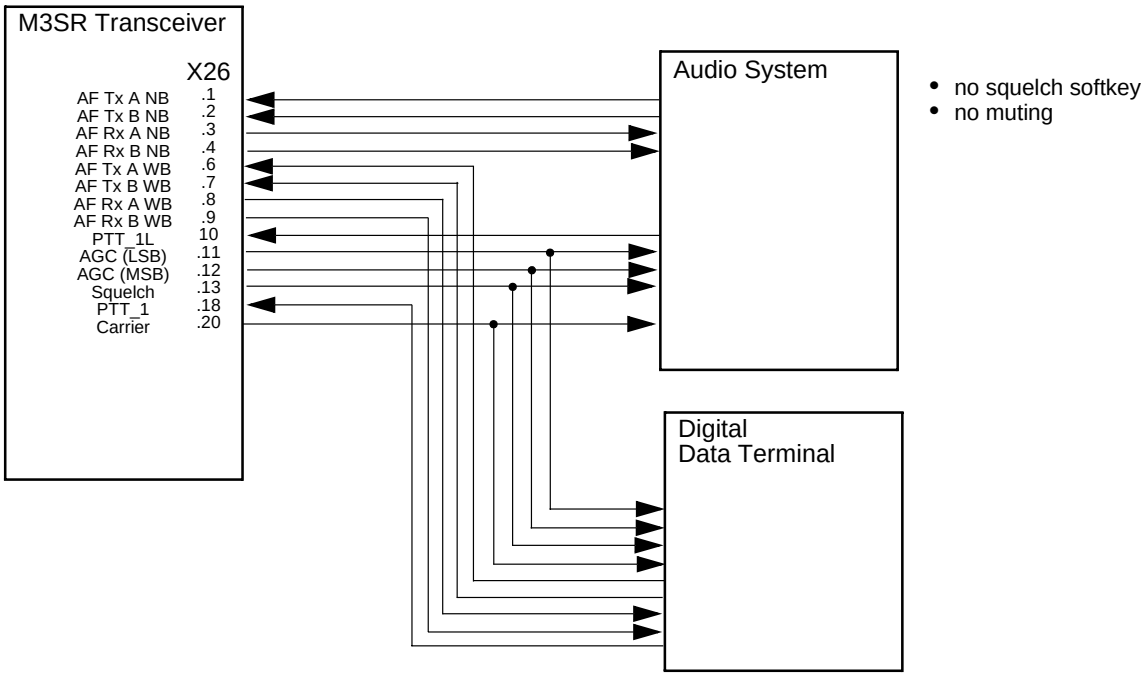
34. Enter a new value for TX Deviation (FM, wideband) by using the numerical keypad, then press ENTER.

Range: 1 kHz to 20 kHz;
6.25 kHz recommended

Note:
Frequency range = 300 Hz to 12 kHz

3.3.3 Wideband Digital

For voice communication, narrowband audio line NB1 is used, carrier activation is performed via keyline PTT_1L low-active. Modulation is in AM or FM (see chapter 3.3.1). In addition, a digital data terminal is connected. Data communication is carried out via wideband audio line WB1 and carrier activation via keyline PTT_1 low-active. Modulation is in ASK (= amplitude shift keying) or FSK (= frequency shift keying).



Communication Mode	Comline	Keylines				Audio Lines				External Device Mapping
		PLL_1L	PTT_1	PTT_2L	PTT_2	NB1	WB1	NB2	WB2	
V/D UNCP	CL1	x				**x**				
WB DIGITAL BB	CL1		**x**				**x**			**Digital Modem**
WB DIGITAL DP	CL1		**x**				**x**			

Note:

In diphase mode, signals can be transmitted with a data rate of up to 32 kbit / s. Please observe the lower cut-off frequency of 30 Hz. Below this frequency the digital AM modulator will switch back to carrier level.

Starting point: Menu 040 (MAIN)

1. Press softkey [RADIO MAINT...]

Menu 400 (RADIO MAINTENANCE)

2. ENTER maintenance PIN by using the numerical keypad, then press ENTER.
3. Press softkeys [PAGE 1/2 MORE...] [DEVICE MAPPING...]

Menu 565 (DEVICE MAPPING)

4. Select SYNC WB DATA by using the tuning knob.
5. Press softkey [◄ CL]
6. Select Comline 1 by using the tuning knob, then press ENTER.
7. Press softkey [SAVE *]

8. Press key 

(front panel).

9. Press key 

again.

10. ENTER maintenance PIN by using the numerical keypad, then press ENTER.

11. Press softkeys 

Menu 560 (AUDIO MAPPING)

12. Check if audio line WB1 is connected with Comline CL1. If necessary, connect.

13. Press softkey 

Menu 550 (PTT COMLINE MAPPING)

14. Check if keyline PTT_1 is connected with Comline CL1, if it is low-active and only effective in remote mode. If necessary, configure.

15. Press softkey 

Menu 570 (SQUELCH POLARITY)

16. Select squelch SQ COMLINE 1 by using the tuning knob.

17. Press softkey 

to set the squelch level to low.

18. Press softkeys 

Menu 510 (RADIO MODULES)

19. Press softkey 

20. Select module audio interface by using the tuning knob.

21. Press softkey 

Menu 512 (AFI PARAMETERS)

22. Press softkey 

23. Select audio line WB1 by using the tuning knob.

24. Press softkey 

25. Enter a new TX LEVEL by using the numerical keypad, then press ENTER.

Range: -3 dB to +15.5 dB
relative to 1.4 V_{pp}

Note:

Approximation to the digital input level will suffice. The signal will be digitized by means of an internal comparator.

26. Press softkey 

27. Enter a new RX LEVEL by using the numerical keypad, then press ENTER.

Range: -3 dB to +15.5 dB
relative to 1.4 V_{pp}

0 dB	=	1.4 V_{pp} into 600 Ω
-3 dB	=	1.0 V_{pp} into 600 Ω
+15.5 dB	=	8.0 V_{pp} into 600 Ω

28. Press softkey 

29. Select module VU POWER AMPLIFIER by using the tuning knob.

30. Press softkey 

Menu 516 (VU TX PARAMETERS)

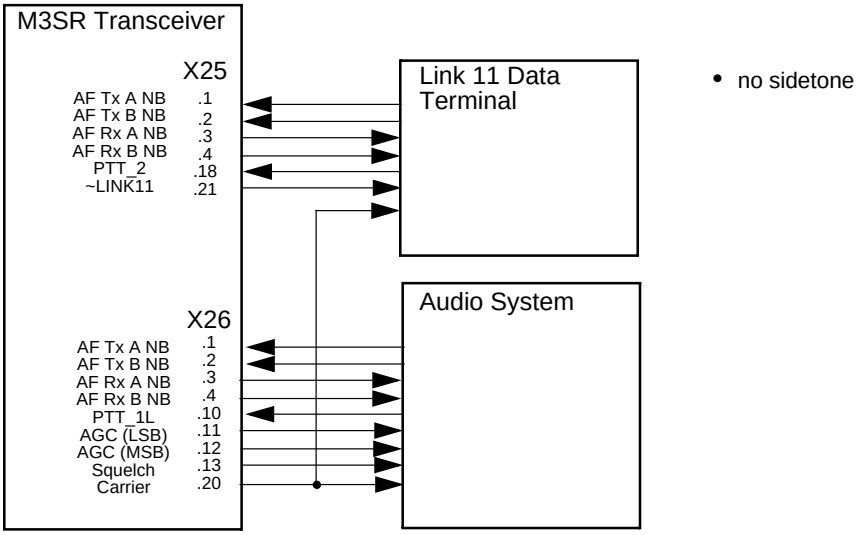
31. Press softkey 

32. Enter a new modulation depth by using the numerical keypad, then press ENTER.

Range: 10% to 99%; 90% recommended

3.3.4 Link 11 (CLEW)

For voice communication, narrowband audio line NB1 is used, carrier activation is performed via keyline PTT_1L low-active. Modulation is in AM or FM (see chapter 3.3.1). In addition, a Link 11 data terminal is connected. Data communication is carried out via narrowband audio line NB2 and carrier activation via keyline PTT_2 high-active. Modulation is in FM.



Communication Mode	Comline	Keylines				Audio Lines				External Device Mapping
		PLL_1L	PTT_1	PTT_2L	PTT_2	NB1	WB1	NB2	WB2	
V/D UNCP	CL1	x				**x**				
LINK 11	CL1				**x**			**x**		**Link 11 Data Terminal**

Starting point: Menu 040 (MAIN)

1. Press softkey [RADIO MAINT...]

Menu 400 (RADIO MAINTENANCE)

2. ENTER maintenance PIN by using the numerical keypad, then press ENTER.
3. Press softkeys [PAGE 1/2 MORE...] [DEVICE MAPPING...]

Menu 565 (DEVICE MAPPING)

4. Select LINK 11 by using the tuning knob.
5. Press softkey [◄ CL]
6. Select Comline 1 by using the tuning knob, then press ENTER.
7. Press softkey [SAVE *]
8. Press key [ON OFF] (front panel).
9. Press key [ON OFF] again.
10. Enter maintenance PIN by using the numerical keypad, then press ENTER.
11. Press softkeys [PAGE 1/2 MORE...] [AUDIO MAPPING...]

Menu 560 (AUDIO MAPPING)

12. Check if audio line NB2 is connected with Comline CL1. If necessary, connect.

13. Press softkey 

Menu 550 (PTT COMLINE MAPPING)

14. Check if keyline PTT_2 is connected with Comline CL1, if it is high-active and only effective in remote mode. If necessary, configure.

15. Press softkey 

Menu 510 (RADIO MODULES)

16. Press softkey 

17. Select module audio interface by using the tuning knob.

18. Press softkey 

Menu 512 (AFI PARAMETERS)

19. Press softkey 

20. Select audio line NB2 by using the tuning knob.

21. Press softkey 

22. Enter a new TX LEVEL by using the numerical keypad, then press ENTER.

Range: 0 dB ±3 dB

23. Press softkey 

24. Enter a new RX LEVEL by using the numerical keypad, then press ENTER.

Range: 0 dB ±3 dB
(effective level into 600 Ω)

Note:

With a Link 11 test signal of 1 kHz with 20 kHz deviation, the output level will be adjustable to 8.25 dB ±3 dBm.

25. Press softkeys 

26. Select module VU SYN (synthesizer) by using the tuning knob.

27. Press softkey 

Menu 517 (VU SYN PARAMETERS)

28. Press softkey 

29. Enter a value of 20 kHz for TX Deviation for Link 11 operation by using the numerical keypad, then press ENTER.

30. Press softkey 

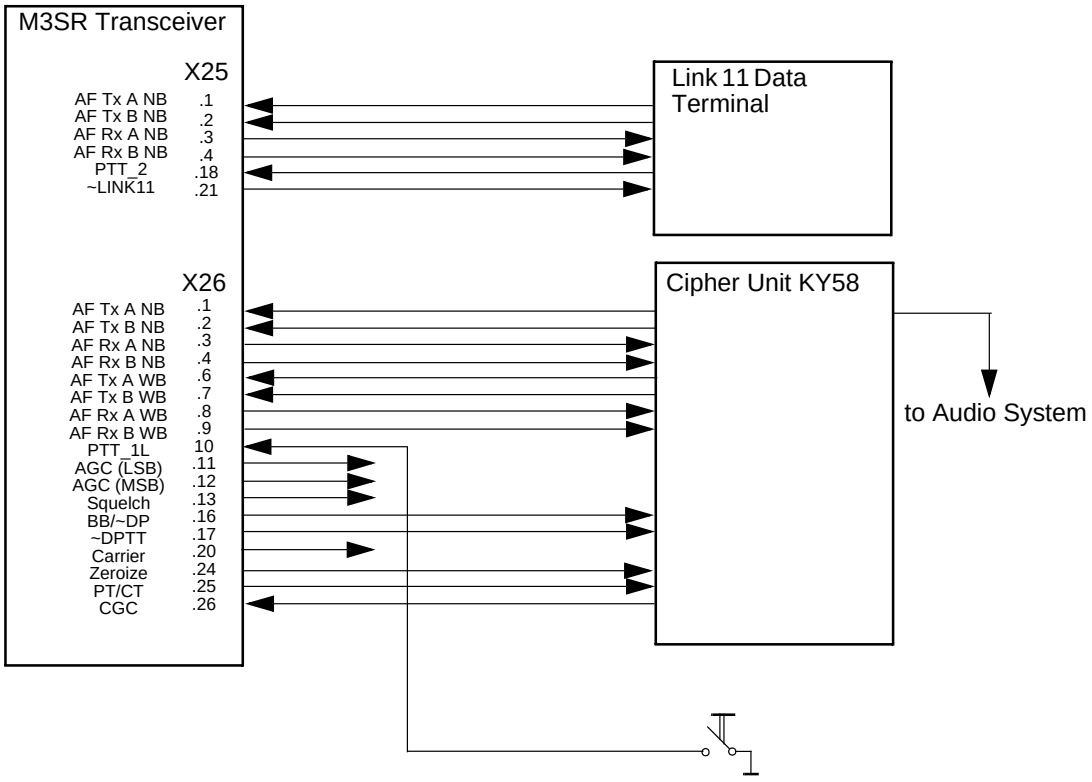
31. Enter a new value for fine tuning of synthesizer FM modulator by using the tuning knob, then press ENTER.

Note:

Fine tuning for 20-kHz deviation (test signal 1 kHz sinusoidal, with effective level of 8.25 dBm into 600 Ω).

3.3.5 Voice Data Ciphered

A Cipher Unit KY58 is connected and operated in baseband mode. For voice communication, narrowband audio line NB1 and wideband audio line WB1 are used, carrier activation is performed via keyline PTT_1L low-active. Modulation is in AM or FM. In addition, a Link 11 data terminal is connected. Data communication is carried out via narrowband audio line NB2 and carrier activation via keyline PTT_2 high-active. Modulation is in FM (see chapter 3.3.4).



Communication Mode	Comline	Keylines				Audio Lines				External Device Mapping
		PLL_1L	PTT_1	PTT_2L	PTT_2	NB1	WB1	NB2	WB2	
V/D UNCP	CL1	x				x				Cipher Unit
V/D CP	CL1						x			
LINK 11	CL1				x			x		Link 11 Data Terminal

Starting point: Menu 040 (MAIN)

1. Press softkey 

Menu 400 (RADIO MAINTENANCE)

2. ENTER maintenance PIN by using the numerical keypad, then press ENTER.

3. Press softkeys 

Menu 565 (DEVICE MAPPING)

4. Select CIPHER UNIT by using the tuning knob.

5. Press softkey 

6. Select Comline 1 by using the tuning knob, then press ENTER.

7. Press softkey 

8. Select KY58BB or KY58DP by using the tuning knob, then press ENTER.

9. Press softkey 

10. Press key 

(front panel).

11. Press key 

again.

12. Enter maintenance PIN by using the numerical keypad, then press ENTER.

13. Press softkeys 

Menu 560 (AUDIO MAPPING)

14. Check if audio lines NB1 and WB1 are connected with Comline CL1. If necessary, connect.

15. Press softkey 

Menu 550 (PTT COMLINE MAPPING)

16. Check if keyline PTT_1L is connected with Comline CL1, if it is low-active and only effective in remote mode. If necessary, configure.

17. Press softkey 

Menu 570 (SQUELCH POLARITY)

18. Select squelch SQ COMLINE 1 by using the tuning knob.

19. Press softkey 

to set the squelch level to low.

20. Press softkeys 

Menu 575 (FRONTPANEL AUDIO SOURCE)

21. Select audio source 1 by using the tuning knob.

22. Press softkey 

23. Select source CL1 by using the tuning knob.

24. Press softkeys 

Menu 580 (MARKER CONTROL)

25. Press softkey 

to enable plain marker tone.

26. Press softkey 

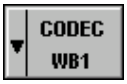
Menu 510 (RADIO MODULES)

27. Press softkey 

28. Select module audio interface by using the tuning knob.

29. Press softkey 

Menu 512 (AFI PARAMETERS)

30. Press softkey 

31. Select audio line NB1 by using the tuning knob.

32. Press softkey 

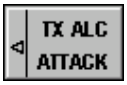
33. Enter a new TX LEVEL by using the numerical keypad, then press ENTER.

Range: -15 dB to 0 dB, if TX-ALC = ON

34. Press softkey 

35. Enter a new RX LEVEL by using the numerical keypad, then press ENTER.

Range: -20 dB to +10 dB

36. Press softkey 

37. Enter a new TX ALC ATTACK time by using the numerical keypad, then press ENTER.

Range: 10 ms to 100 ms;
30 ms recommended

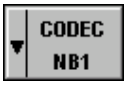
38. Press softkey 

39. Enter a new TX ALC DECAY time by using the numerical keypad, then press ENTER.

Range: 100 ms to 2 000 ms;
300 ms recommended

40. Press softkey 

to switch on the automatic level control.

41. Press softkey 

42. Select audio line WB1 by using the tuning knob.

43. Press softkey 

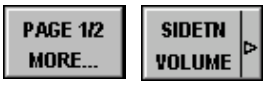
44. Enter a new TX LEVEL by using the numerical keypad, then press ENTER.

Range: -3 dB to +15.5 dB
relative to 1.4 V_{pp}

0 dB	=	1.4 V_{pp} into 600 Ω
-3 dB	=	1.0 V_{pp} into 600 Ω
+15.5 dB	=	8.0 V_{pp} into 600 Ω

45. Press softkey 

46. Enter a new RX LEVEL according to step 44.

47. Press softkeys 

48. Enter a new value for SIDETONE VOLUME by using the numerical keypad, then press ENTER.

Range: -25.5 dB to 0 dB
relative to selected audio Rx level

49. Press softkey 

50. Enter a new value for MARKER VOLUME according to step 48.

51. Press softkey 

52. Select module VU POWER AMPLIFIER by using the tuning knob.

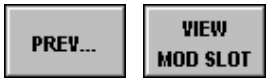
53. Press softkey 

Menu 516 (VU TX PARAMETERS)

54. Press softkey 

55. Enter a new modulation depth by using the numerical keypad, then press ENTER.

Range: 10% to 99%; 90% recommended

56. Press softkeys 

57. Select module VU RX (receiver) by using the tuning knob.

58. Press softkey 

Menu 515 (VU RX PARAMETERS)

59. Press softkey 

60. Select a new AF AGC ATTACK time by using the tuning knob, then press ENTER.

61. Press softkey 

62. Select a new AF AGC DECAY time by using the tuning knob, then press ENTER.

63. Press softkey 

64. Enter a new threshold by using the numerical keypad, then press ENTER.

Range: 6 dB to 20 dB

65. Press softkey 

66. Select a new clipper level by using the tuning knob, then press ENTER.

67. Press softkey 

68. Select module VU SYN (synthesizer) by using the tuning knob.

69. Press softkey 

Menu 517 (VU SYN PARAMETERS)

70. Press softkey 

71. Enter a new value for TX Deviation (FM, narrowband) by using the numerical keypad, then press ENTER.

Range: 1 kHz to 20 kHz; 3.5 kHz recommended

3.4 Guard Receiver

The guard receiver is a common resource, meaning that it is not assigned to any particular Comline.

There are two different ways for the guard receiver to be operated.

a) Without audio mapping

- Plug the module Guard Receiver ET 4400G into the M3SR Transceiver. No audio mapping is necessary.
- The guard receiver is only available in communication mode Voice / Data unciphered (V/D UNCP).
- Depending on the selection made by using softkey GUARD (Menus 110 (MANUAL FIX.FRQ) and 210 (USER PRESET FIX.FRQ)), the guard receiver AF signal is mixed to the main receiver AF signal.
- Depending on the selection made by using softkey GUARD, the LEDs G (Control Unit) and SQL G (Front Panel), as well as a status message in the display signal an emergency call.
- Reception of an emergency call is signalled at contact X26.19 always, irrespective of the selection made by softkkey GUARD.
- The volume of the GRx audio signal is configured in Menu 512 (AFI PARAMETERS).

b) With audio mapping

- Audio line NB2 is assigned to the guard receiver via Menu 560 (AUDIO MAPPING).
- The guard receiver AF signal is available on audio line NB2 irrespective of the communication mode and the selection made by softkey GUARD (Menus 110 (MANUAL FIX.FRQ) and 210 (USER PRESET FIX.FRQ)).
- Reception of an emergency call is signalled at contact X26.19 always, irrespective of the selection made by softkkey GUARD.
- The volume of the GRx audio signal is configured in Menu 512 (AFI PARAMETERS).

Note:

Communication mode Link 11 cannot be used when audio line NB2 is assigned to the guard receiver.

3.5 Preset Page

3.5.1 General

- ❑ A Preset Page always consists of two areas:
  - Fixed Frequency area
  - EPM area (not used in this application)

- ❑ For the Preset Pages the full choice of functions is available, regardless of the functions actually supported by the relevant radio. So for example Link 11 communication mode can be selected, although your radio may not have such functionality.

- ❑ A plausibility check will only be performed when the Preset Page is called. So when Link 11 mode is set in a Preset Page and this page is then called on a radio that does not support Link 11 functionality, the default (communication mode V/D UNCP) will be activated instead.

- ❑ When editing the Preset Pages make sure that matching parameters are selected. For instance for communication mode Link 11 select modulation type FM.

3.5.2 Introduction to Loaded, User and Current Pages

Page storage within the radio is based on a redundancy concept. There are three areas for the Preset Page to be stored:

- ❑ Loaded Page area: pages with factory and / or customer-predefined settings
- ❑ User Page area: copies of Loaded Pages that can be edited
- ❑ Current Page area: currently used page

3.5.2.1 Loaded Page Area

Pages with factory and / or customer-predefined settings are referred to as Loaded Pages and can only be changed by the administrator. Identical copies of the Loaded Pages are used as basis for User Pages and Current Pages, which can then be edited by the operator as required.

Normally Loaded Pages will be loaded into the radio via the Service and Maintenance Tool ZS 4400. In some cases, however, it may be necessary to enter these pages manually, which can be done only by an administrator having the required setup PIN. For editing a Preset Page an editor (Menu 710 (EDIT PRESET PAGE FIX.FRQ)) is available. Softkey SAVE AS is used to store the edited Preset Page as Loaded Page and simultaneously as User Page.

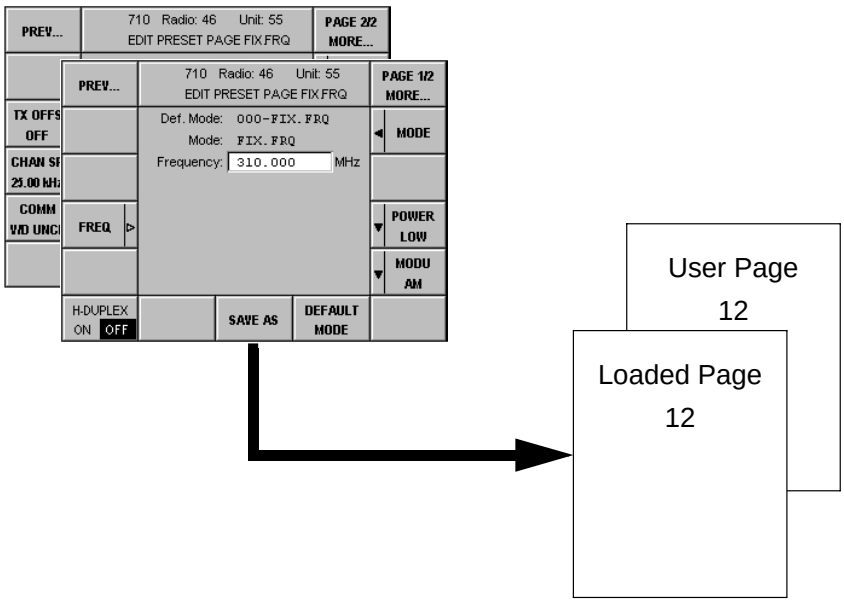


Fig. 3.2 Editing and Storing a Loaded Page

3.5.2.2 User Page Area

The User Pages are a copy of the Loaded Pages, which can be edited for ongoing operation. User Pages can be restored to the Loaded Page settings either individually or globally. In the figures below any text in italics indicates that this page has been edited.

By pressing softkey RESTORE PAGE (Menu 210 (USER PRESET FIX.FRQ)) a specific User Page is restored to the relevant Loaded Page setting. Here Restore also has an immediate impact on the Current Page.

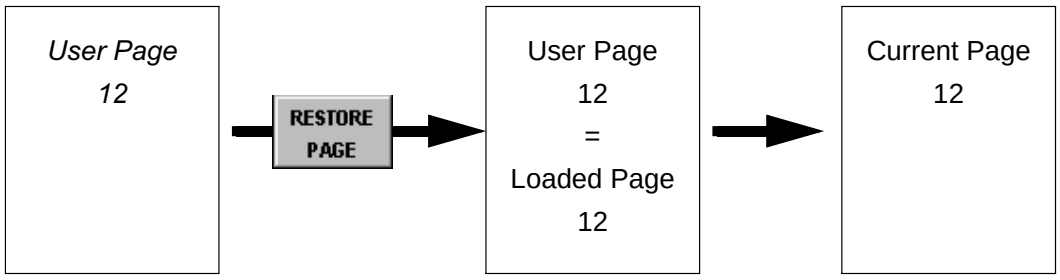


Fig. 3.3 Restoring a Specific User Page

By pressing softkey RESTORE PRESET (Menu 610 (PRESET CONFIGURATION)) all User Pages are restored to the relevant Loaded Page settings. For this no particular User Page needs to be entered. Here Restore has no impact on the Current Page.

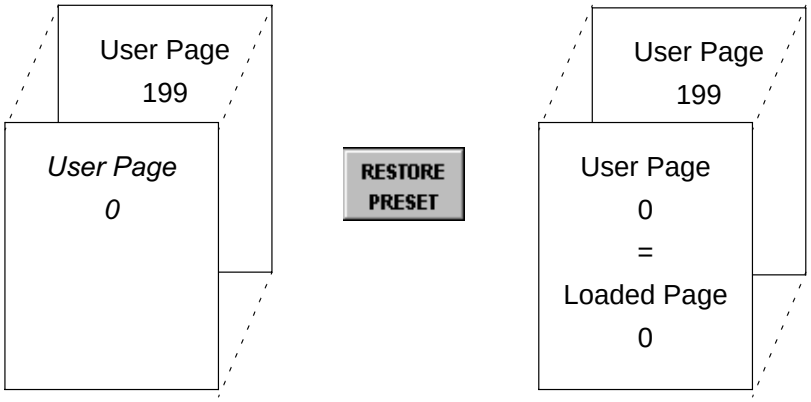


Fig. 3.4 Restoring All User Pages

3.5.2.3 Current Page Area

The currently used User Page is the Current Page.

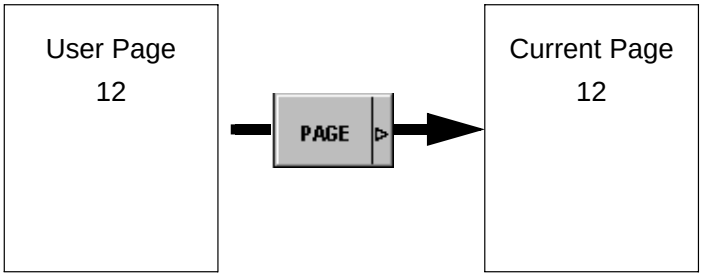


Fig. 3.5 Activating a Specific User Page

The Current Page can be edited by the operator in the Preset Page editor (Menu 210 (USER PRESET FIX.FRQ)). By pressing softkey SAVE PAGE the edited settings can be saved in the User Page. A User Page modified in this way is marked by an asterisk.

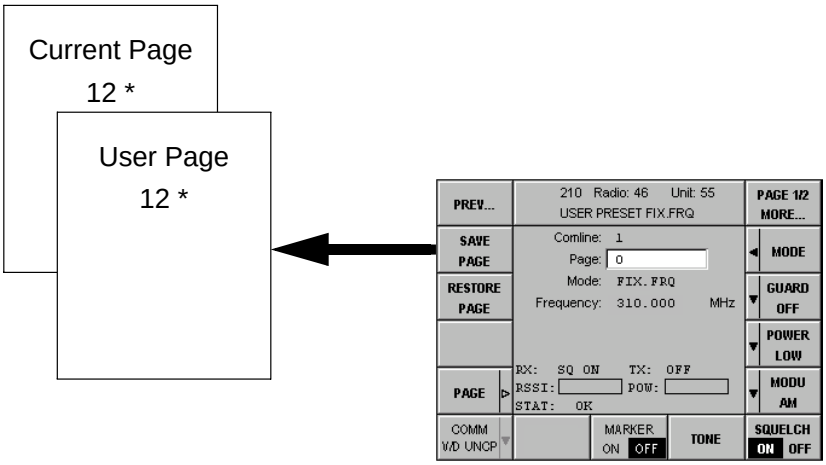


Fig. 3.6 Editing and Saving a Current Page

3.6 PIN Numbers

To protect the radio system from tampering there are two levels of PIN (Personal Identification Numbers) numbers in force:

- ❑ System PIN
- ❑ User PINs

System PIN

- The System PIN is used to globally change the User PINs.
- The System PIN is unique and firmly tied to one particular radio. The System PIN is derived from the equipment serial number and can be retrieved any time from the manufacturer, if lost.
- The System PIN is intended to be used by service or supervisor staff.

User PINs

The User PINs are required to gain access to the Maintenance and Setup areas of the radio and also when the operator wants to change from Comline Session to Radio Session. There are three User PINs for the transceiver and one User PIN for the control unit.

Transceiver

- Radio Maintenance PIN
  The Radio Maintenance PIN is used to gain access to the Maintenance area. In the Maintenance area it is for instance possible to clear the error list and/or to configure the transceiver.
- Radio Setup PIN
  The Radio Setup PIN is used to gain access to the Setup area. In the Setup area it is possible to create, modify and/or clear the Preset Pages.
- Radio Session PIN
  The Radio Session PIN is used to change from Comline to Radio session. In the Radio session it is for instance possible to assign the modules to Comline CL1 and to reactivate the default settings.

Control unit

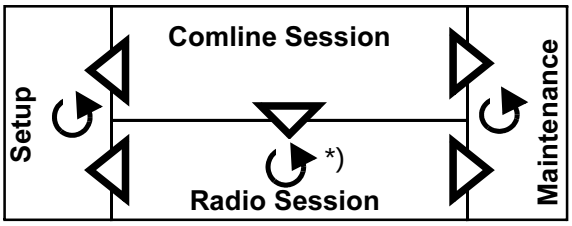
- CU Maintenance PIN
  The CU Maintenance PIN is used to gain access to the control unit Maintenance area. In the Maintenance area it is for instance possible to clear the error list and/or to configure the display parameters.

These PIN numbers can be changed by the operator. The default setting (factory setting) of these PIN numbers is "00000". But please keep in mind: Once changed, the default setting is no longer valid and cannot be used any more.

Each PIN number to be entered or changed is a five-digit decimal figure.

The figure below illustrates when a User PIN needs to be entered and where it can be changed:

Transceiver

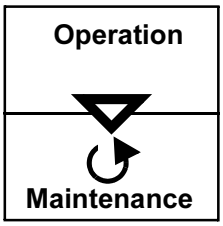


▽ = PIN required

↻ = PIN changeable

*) = not yet implemented

Control Unit



The relevant User PIN can be changed in Menu 400 (Radio Maintenance), Menu 600 (Radio Setup) and Menu 800 (CU Maintenance), respectively.

In addition, the User PINs can be changed globally via Menu 0 (System Menu).

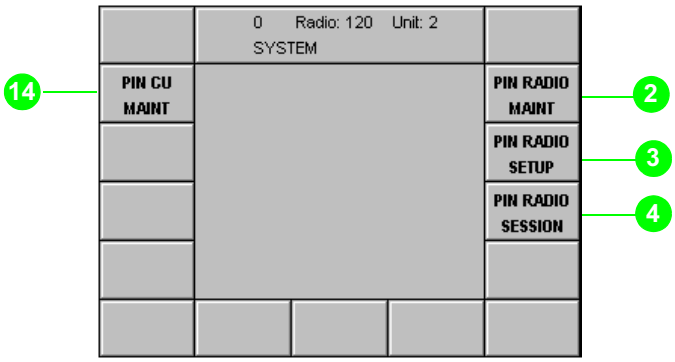
3.7 Configuration

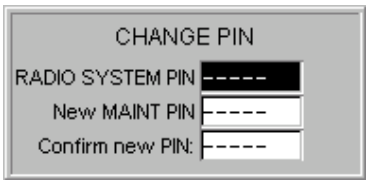
3.7.1 Menu 0: SYSTEM

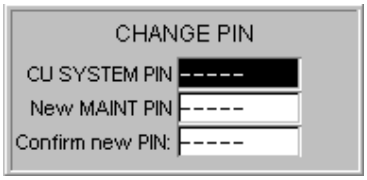
In Menu 0 (SYSTEM) the User PINs can be changed globally (for details on PIN numbers refer to chapter 3.6).

☞ Press key [MENU HOME] and key [ENT] simultaneously.

❑ The following display appears:



No.	Control	Action	Notes
2	[PIN RADIO MAINT]	Press softkey PIN RADIO MAINT.	Entry of new radio maintenance PIN  1. Enter the RADIO SYSTEM PIN number by using the numerical keypad, then press ENTER. 2. Enter new MAINT PIN number by using the numerical keypad, then press ENTER. 3. Confirm the new MAINT PIN number by repeating the entry by using the numerical keypad, then press ENTER.
	[PIN RADIO MAINT]	Abort entry.	
3	[PIN RADIO SETUP]		For entry of a new radio setup PIN follow the same procedure as described for the radio maintenance PIN (see softkey 2).

No.	Control	Action	Notes
4	PIN RADIO SESSION		For entry of a new radio session PIN follow the same procedure as described for the radio maintenance PIN (see softkey 2).
14	PIN CU MAINT PIN CU MAINT	Press softkey PIN CU MAINT. Abort entry.	Entry of new CU maintenance PIN  1. Enter the CU SYSTEM PIN number by using the numerical keypad, then press ENTER. 2. Enter new MAINT PIN number by using the numerical keypad, then press ENTER. 3. Confirm the new MAINT PIN number by repeating the entry by using the numerical keypad, then press ENTER.

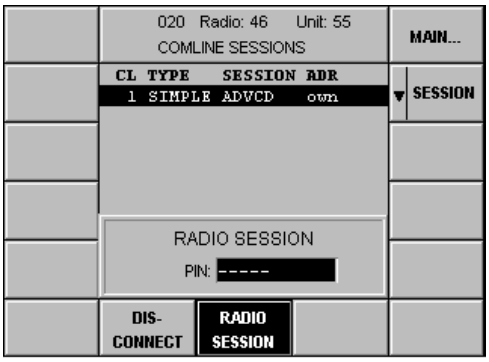
3.7.2 Menu 030: RADIO SESSION

Changing from Comline session to Radio session is required to

- ❑ restore the default settings (see Appendix A1),
- ❑ install radio options (Menu 505 (RADIO OPTIONS)),
- ❑ connect a radio module to the Comline (Menu 510 (RADIO MODULES)),
- ❑ configure split-site operation (Menu 535 (SPLIT SITE DEFINITION))

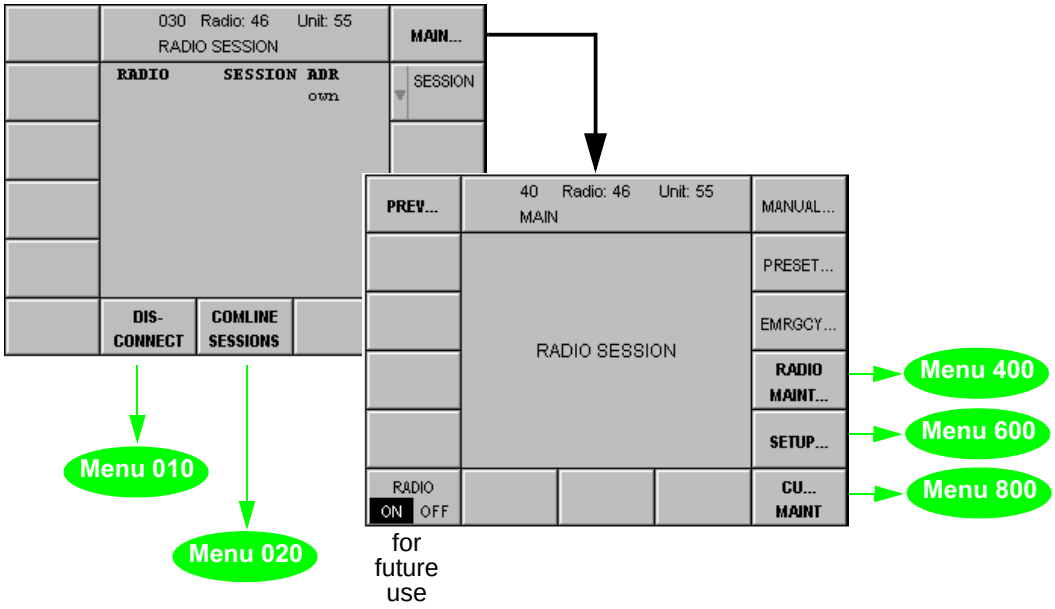
Starting point: Menu 020 (COMLINE SESSION)

☞ Press softkey (8) **RADIO SESSION** and the following display appears:



☞ Enter RADIO SESSION PIN number by using the numerical keypad.

☞ Confirm with ENTER key.

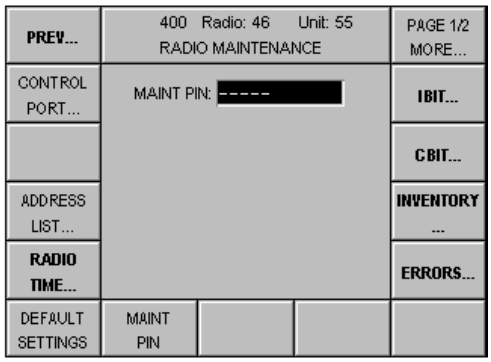


3.7.3 Menu 400, Page 1: RADIO MAINTENANCE

Via this menu the maintenance functions implemented in the radio are activated. The maintenance functions relate to the assignment of radio resources to Comlines, squelch polarity, inventory report, failure archive and initiation of IBIT functions. Access to some of the maintenance functions is protected by a PIN (Personal Identification Number), for Inventory, Errors and Radio Time, however, no PIN is required. Some maintenance functions should only be activated by trained maintenance staff.

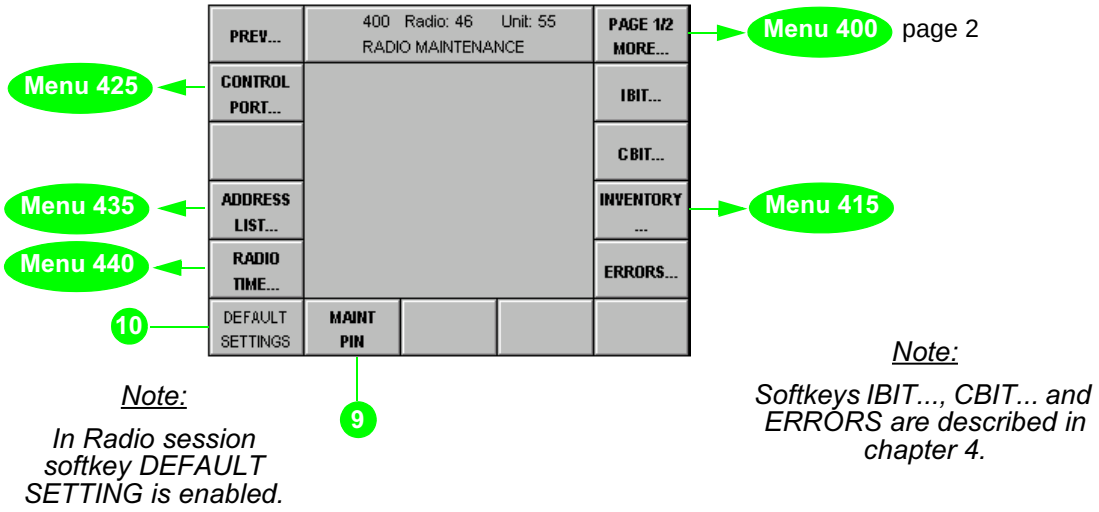
Starting point: Menu 040 (MAIN)

☞ Press softkey (4) [RADIO MAINT...] and the following display appears:

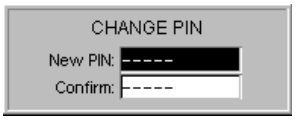


☞ Enter maintenance PIN (5 digits) by using the numerical keypad, then press ENTER.

❑ The following display appears:



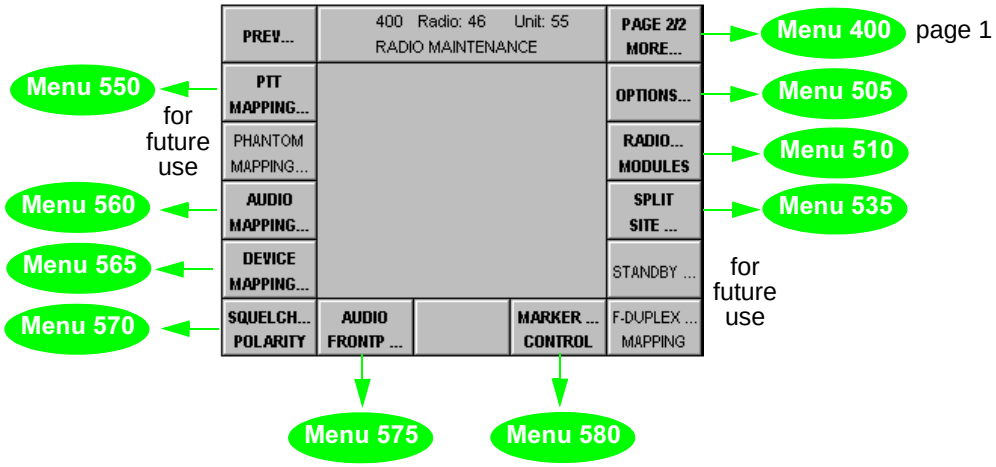
☞ Press the relevant softkey to call one of these menus.

No.	Control	Action	Notes
9	MAINT PIN MAINT PIN	Press softkey MAINT PIN. Abort entry.	Entry of new maintenance PIN  1. Enter the new PIN number by using the numerical keypad, then press ENTER. 2. Confirm the new PIN number by repeating the entry by using the numerical keypad, then press ENTER. See also chapter 3.6.
10	DEFAULT SETTINGS *Note:* *In Radio session this softkey is enabled.* DEFAULT SETTINGS	Press softkey DEFAULT SETTINGS. Abort process.	Resets all maintenance parameters of transceiver to default settings.  See List of Default Parameters in Appendix A1.

3.7.4 Menu 400, Page 2: RADIO MAINTENANCE

Starting point: Menu 400, page 1

☞ Press softkey (1) [PAGE 1/2 MORE...] and the following display appears:



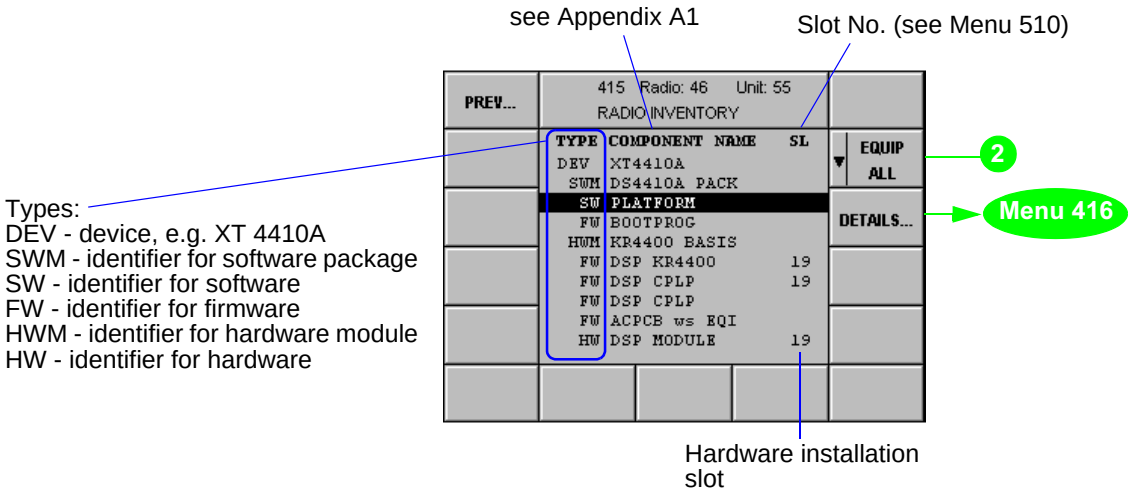
☞ Press the relevant softkey to call one of these menus.

3.7.5 Menu 415: RADIO INVENTORY

This menu gives a survey of all hardware, software and firmware components installed in M3SR Transceiver X. 4410A or X. 4460A.

Starting point: Menu 400, page 1 (RADIO MAINTENANCE)

☞ Press softkey (4) [INVENTORY ---] and the following display appears:

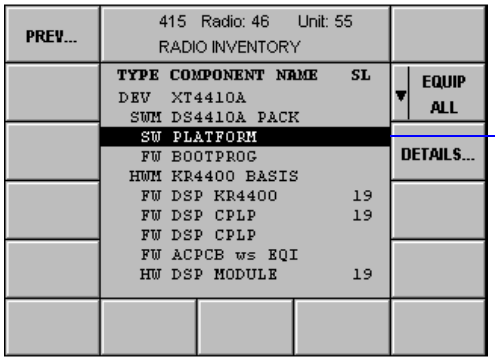


No.	Control	Action	Notes
2	ALL CL1 FW HW SW HWMOD SWMOD DEV EQUIP ALL	Press softkey EQUIP. Select setting.	Selection of equipment for radio inventory Depending on the item selected the following components are listed: **ALL:** all components installed **CL1:** components of CL1 **FW:** firmware components **HW:** all hardware components **SW:** all software components **HWMOD:** name of the HW module article **SWMOD:** name of the SW module article **DEV:** XT 4410A or X. 4460A

3.7.6 Menu 416: RADIO INVENTORY DETAILS

This menu displays administrative data of a component.

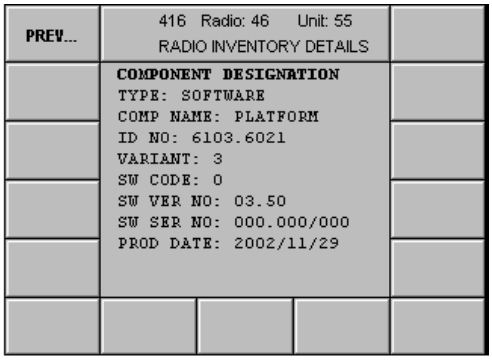
Starting point: Menu 415 (RADIO INVENTORY)



☞ Select component.

☞ Press softkey (3) **DETAILS...** and the following display appears:

Example: Software Designation



The data for the component selected in Menu 415 comprise the following:

- Type (hardware, software, firmware)
- Name of module or software
- Ident. No.
- Variant
- Code No.
- Version No.
- Serial No.
- Production Date

3.7.7 Menu 425: RADIO CONTROL PORT

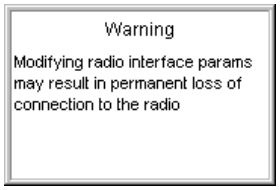
Via this menu the serial control port parameters can be viewed and edited.

Note:

One of the parameters to be configured in Menu 425 is the protocol for data communication via serial control port (X24). Irrespective of this setting, the protocol used at the LAN interfaces (X6 and X20) is always GB2PP.

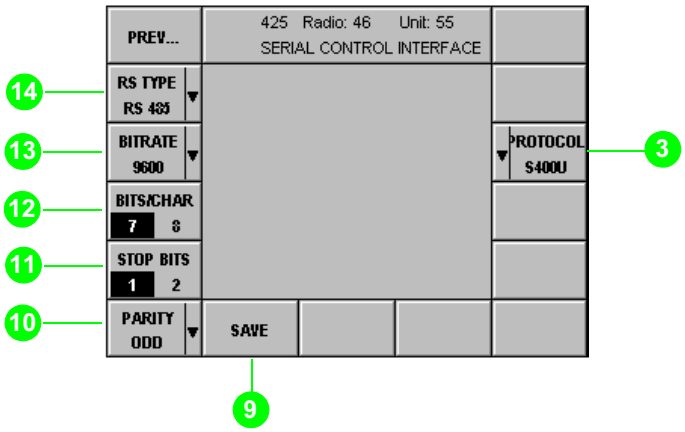
Starting point: Menu 400, page 1 (RADIO MAINTENANCE)

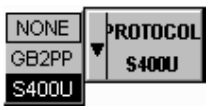
☞ Press softkey (14) [CONTROL PORT...] and the following message appears:

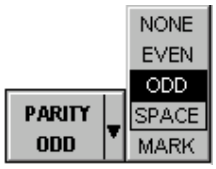
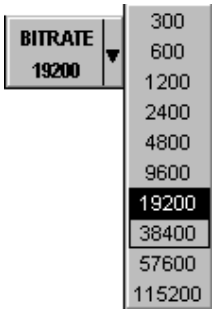
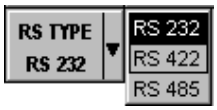


Pay attention to the Warning!

☞ Press softkey (9) [CLOSE] and the following display appears:



No.	Control	Action	Notes
3		Press softkey PROTOCOL. Select setting.	Selection of protocol type **NONE:** no remote control via control port **GB2PP:** remote control via GB2PP protocol is possible (RS 232, RS 422) *Note:* *Only for point-to-point connection!* **S400U:** remote control via S400U protocol is possible (RS 232, RS 422, RS 485)

No.	Control	Action	Notes
9		Press softkey SAVE.	Saves the current settings. The asterisk (*) indicates that the new settings have not yet been stored.
10		Press softkey PARITY. Select setting.	Selection of parity **NONE:** no parity **EVEN:** even number of bits **ODD:** odd number of bits **SPACE:** parity fixed at 0 **MARK:** parity fixed at 1
11		Press softkey STOP BITS.	Setting the number of stop bits
12		Press softkey BITS/CHAR.	Setting the number of bits in the telegram
13		Press softkey BITRATE. Select setting.	Selection of bitrate
14		Press softkey RS TYPE. Select setting.	Selection of serial port standard. *Note:* *Regarding the RS 485 interface please take note of the following: CSMA/CD (Carrier-Sense Multiple Access with Collision Detection) is not supported by the radio. Bus operation is only possible with S400U protocol (see softkey 3) and Control Unit GB 406 (application protocol prevents collisions).*

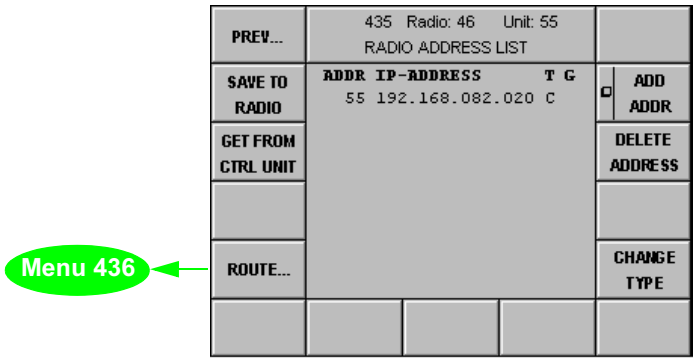
3.7.8 Menu 435: RADIO ADDRESS LIST

Note:

With M3SR Transceiver XT 4410A, the address of the integrated control unit needs to be entered here.

Starting point: Menu 400, page 1 (RADIO MAINTENANCE)

☞ Press softkey (13) **ADDRESS LIST...** and the following display appears:



Note:

We recommend to enter also the radio's own address (logical and IP address). If you fail to do so and then press softkey GET FROM RADIO (see chapter 3.7.35) later on, no connection will be established from the control unit to the radio.

3.7.9 Menu 436: RADIO ADDRESS ROUTE

For addressing the M3SR devices the Internet Protocol (IP) is used. Therefore a unique IP address needs to be assigned to each device, permitting the device to be identified and addressed without ambiguity. In addition, each device needs a freely selectable logical address in the range from 000 to 999, which is the address to be entered in Menu 010 (RADIO CONNECTION) for addressed operation. The logical address spares the operator the tedious task of entering the complex IP addresses.

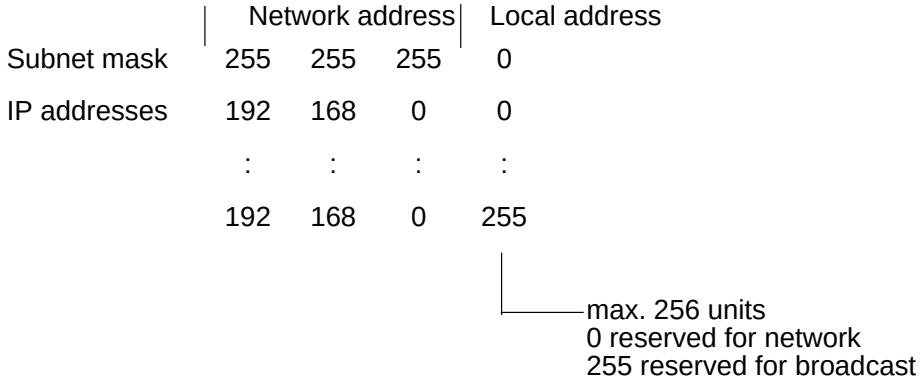
Via Menu 436 the own address (logical and IP address) can be entered. When specifying the Subnet Mask and the IP addresses (own and Gateway), please observe the IETF (= Internet Engineering Task Force) standards (RFC pages (= Request for Commands)), in particular:

- ❑ 796: Address Mappings
- ❑ 940: Toward an Internet Standard Scheme for Subnetting
- ❑ 950: Internet Standard Subnetting Procedure
- ❑ 1219: On the Assignment of Subnet Numbers
- ❑ 1517: Applicability Statement for the Implementation of Classless Inter-Domain Routing
- ❑ 1519: Classless Inter-Domain Routing: an Address Assignment and Aggregation Strategy
- ❑ 1918: Address Allocation for Private Internets

In compliance with RFC1918 the following address ranges are reserved for private networks:

- ❑ 10.0.0.0 to 10.255.255.255, associated subnet mask 255.0.0.0
- ❑ 172.16.0.0 to 172.31.255.255, associated subnet mask 255.255.0.0
- ❑ 192.168.0.0 to 192.168.0.255, associated subnet mask 255.255.255.0

The subnet mask defines the respective address parts for network address and local address.

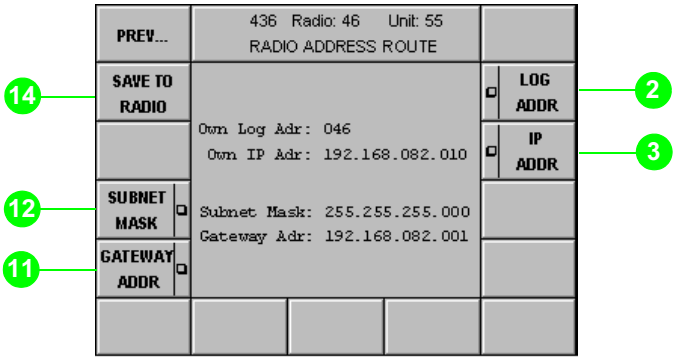


Note:

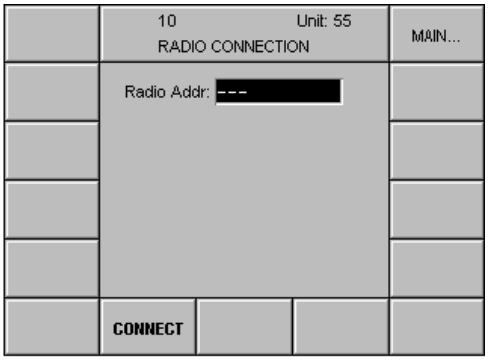
- *IP addresses 0.0.0.0 and 255.255.255.255 are not permitted to be used.*
- *For the net infrastructure, e.g. router, we recommend to use the lower local addresses.*

Starting point: Menu 435 (RADIO ADDRESS LIST)

☞ Press softkey (11) **ROUTE...** and the following display appears:



No.	Control	Action	Notes
2	**LOG ADDR**	Press softkey LOG ADDR. Change value.	Changing the own logical address: OWN LOGICAL ADDRESS Log Addr: 046 Range of values: 001 to 999
3	**IP ADDR**	Press softkey IP ADDR. Change value.	Changing the own IP address: OWN IP ADDRESS IP Addr: 192.168.082.010
11	**GATEWAY ADDR**	Press softkey GATEWAY ADDR. Change value.	Changing the gateway address: GATEWAY ADDRESS IP Addr: 192.168.082.001 *Note:* *000.000.000.000 will delete an existing gateway address.*
12	**SUBNET MASK**	Press softkey SUBNET MASK. Change value.	Changing the subnet mask: SUBNET MASK IP Addr: 255.255.255.000

No.	Control	Action	Notes
14	SAVE TO * RADIO	Press softkey SAVE TO RADIO.	Saves address and subnet mask to the radio. The asterisk (*) indicates that the new settings have not yet been stored. ❑ When softkey SAVE * has been pressed, the radio automatically performs a restart. ❑ The following display appears:  ☞ Switch radio off and on again. ☞ Enter the radio address (see Menu 010).

3.7.10 Menu 440: RADIO TIME and DATE

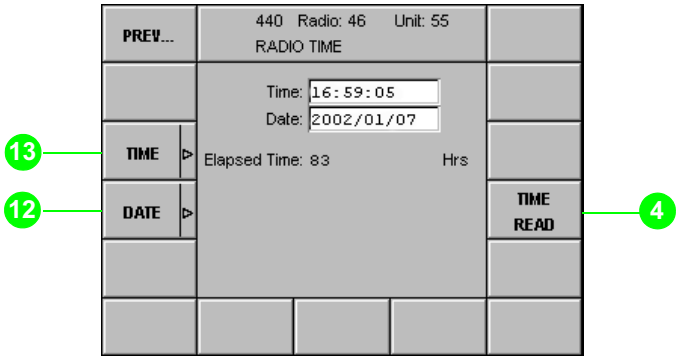
Via this menu the time and date stored in the radio can be edited.

Note:

The time and date entered here are only used to determine when exactly an error occurred. Time, date and error are recorded in the error list (Menu 421 (RADIO ERROR LIST) or Menu 821 (CU ERROR LIST)).

Starting point: Menu 400, page 1 (RADIO MAINTENANCE)

☞ Press softkey (11) [RADIO TIME...] and the following display appears:



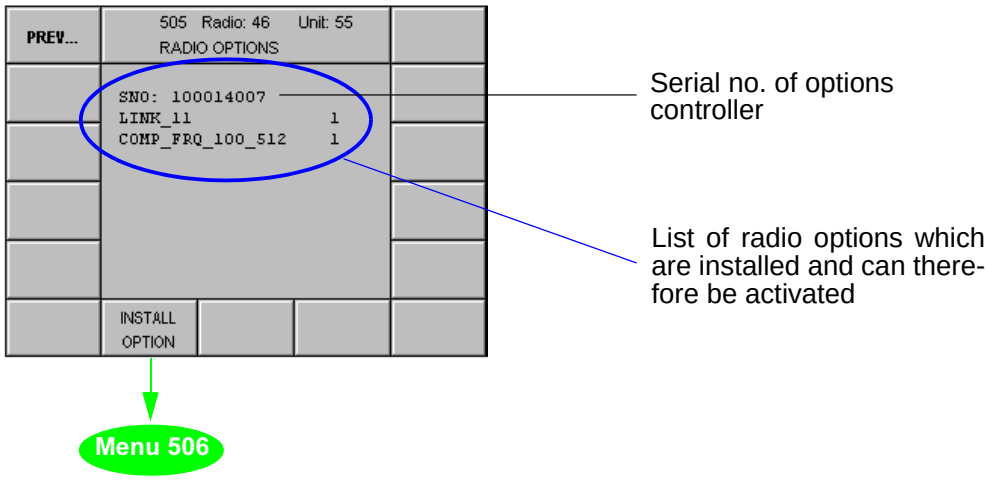
No.	Control	Action	Notes
4	[TIME READ]	Press softkey TIME READ.	When softkey TIME READ is pressed, GB 4000C starts reading the current time and date from the connected radio.
12	[DATE]	Press softkey DATE. Set value.	Setting a new date Date: 2002/01/07 The year can be set between 1999 and 2037. The date within the radio is adjusted accordingly.
13	[TIME]	Press softkey TIME. Set value.	Setting a new time Time: 16:59:05 The time is entered in 24 h format. The time within the radio is adjusted accordingly.

3.7.11 Menu 505: RADIO OPTIONS

In this menu all available radio options are listed.

Starting point: Menu 400, page 2 (RADIO MAINTENANCE)

☞ Press softkey (2) [OPTIONS...] and the following display appears:



Note:

In Radio session softkey INSTALL OPTION is enabled.

Note:

The SNO (Serial Number) of the options controller is the number you need to specify when ordering a new option from Rohde&Schwarz. You will then get a SOC (Software Options Controller) file that can be loaded by using the Service & Maintenance Tool.

3.7.12 Menu 506: SET OPTIONS

Note:

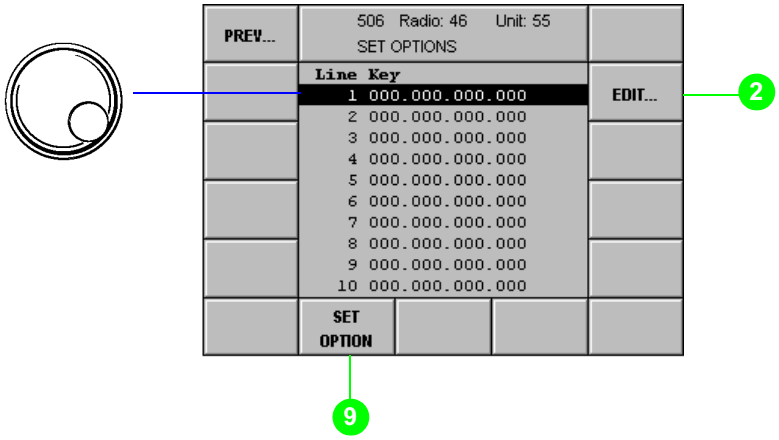
Option codes can best be loaded into the radio via LAN by using the R&S Service & Maintenance Tool ZS 4400 (Ident. no. 6105.2600.02).

In this menu any new option can be installed. The data which need to be entered must be requested from the manufacturer.

Starting point: Menu 505 (RADIO OPTIONS)

☞ Press softkey (9) **INSTALL OPTION** and the following display appears:

☞ Select line where key is to be entered.



No.	Control	Action	Notes
2	EDIT...	Press softkey EDIT...	In order to enable further options the new keys are to be entered.
	EDIT...	Abort entry.	Edit Options New: ---.---.---.---
9	SET OPTION	Press softkey SET OPTIONS.	Activates options which are already installed.

Note:

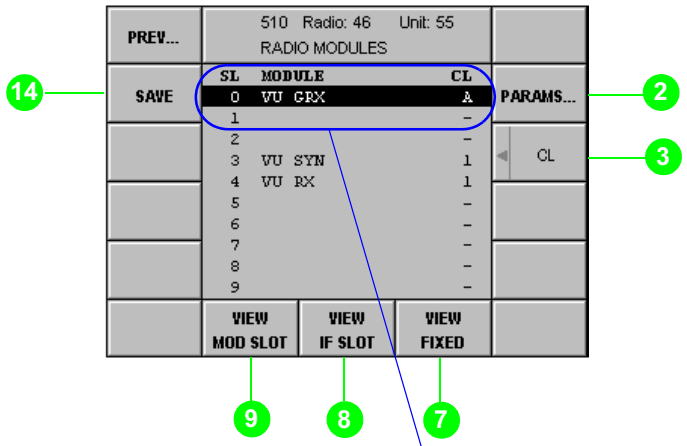
After loading an option code, either via the LAN interface and the Service & Maintenance Tool ZS 4400 or by input in Menu 506 via the numerical keypad, switch the radio off and on again. Allow approximately 1 minute for the option to be activated.

3.7.13 Menu 510: RADIO MODULES

In this menu the individual radio modules are assigned to the Comlines.

Starting point: Menu 400, page 2 (RADIO MAINTENANCE)

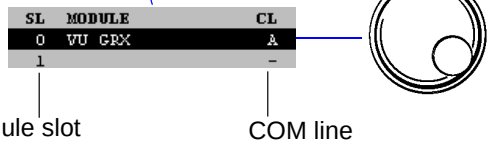
☞ Press softkey (3) [RADIO... MODULES] and the following display appears:



Note:

In Radio session softkey CL is enabled.

Softkey PARAMS provides access to further menus where module parameters can be edited (for Default Settings see Appendix A1).



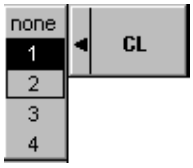
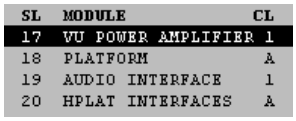
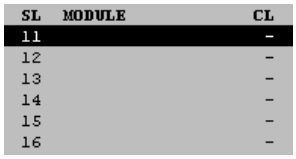
☞ Select module.

Module slot

COM line

1 = Comline number
A = all, module is a common resource (assigned to all Comlines)

No.	Control	Action	Notes
2	PARAMS...	Press softkey PARAMS...	Switches to one of the following menus depending on the module selected. In the following menus module parameters can be edited: Platform: **Menu 511** AFI (AF interface): **Menu 512** Platform interfaces: **for future use** Receiver: **Menu 515** Transmitter: **Menu 516** Synthesizer: **Menu 517**

No.	Control	Action	Notes
3		Press softkey CL. Select value.	The selected module is assigned to one of the radio Comlines. *Note:* *With M3SR Transceiver X. 4410A or X. 4460A, one Comline is available. Comlines 2 to 4 are inactive. In Radio session softkey CL is enabled.*
7		Press softkey VIEW FIXED.	Displays a list of "fixed" modules, that is, modules that are firmly built in (for instance slot no. 18 for platform, 19 for audio interface). 
8		Press softkey VIEW IF SLOT.	Displays a list of interface modules at the rear (11 to 16, backplane, IF slots). 
9		Press softkey VIEW MOD SLOT.	Displays a list of plug-in modules (0 to 10). For display see previous page.
14		Press softkey SAVE.	Saves the current configuration. The asterisk (*) indicates that the new settings have not yet been stored.

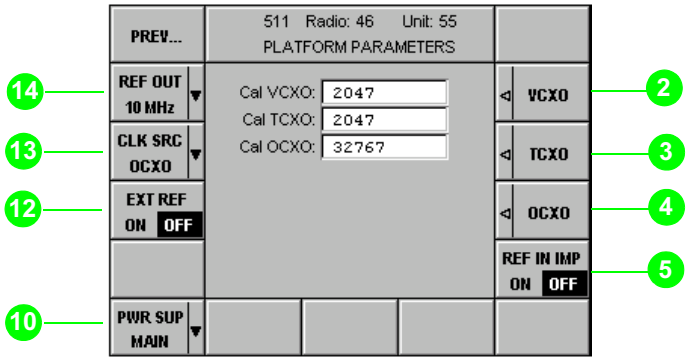
3.7.14 Menu 511: PLATFORM PARAMETERS

In this menu radio platform parameters can be edited. The parameter default settings are factory-defined and should only be changed by service staff, for instance by using the R&S Service & Maintenance Tool ZS 4400 (Ident. no. 6105.2600.02).

Starting point: Menu 510 (RADIO MODULES)

☞ Press softkey (7) [VIEW FIXED] and select module PLATFORM by using the tuning knob.

☞ Press softkey (3) [PARAMS...] and the following display appears:

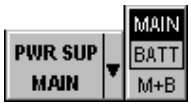
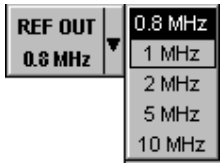


Note:

For Default Settings see Appendix A1.

The VCXO, TCXO and OCXO leave the factory correctly calibrated. After extended periods of operation, however, it may be necessary to re-calibrate the TCXO and OCXO to compensate effects of aging. This should be done by service staff only. The default setting (see Appendix A1) is not restored when the DEFAULT SETTING softkey is pressed.

No.	Control	Action	Notes
2	VCXO	Press softkey VCXO. Set value.	Setting the tuning value for the VCXO frequency Cal VCXO: 2047 Range of values: 0 to 4 095
3	TCXO	Press softkey TCXO. Set value.	Setting the tuning value for the TCXO frequency Cal TCXO: 2047 Range of values: 0 to 4 095
4	OCXO	Press softkey OCXO. Set value.	Setting the tuning value for the OCXO frequency Cal OCXO: 32767 Range of values: 0 to 65 535

No.	Control	Action	Notes
5		Press softkey REF IN IMP.	Switches the input impedance of interface X10 (Reference Frequency): **OFF:** input is high impedance **ON:** 50-Ω input at X10 enabled
10		Press softkey PWR SUP. Select setting.	Selection of the input to be monitored (CBIT): **MAIN:** selects X31 **BATT:** selects X32 **M + B:** selects both DC power inputs
12		Press softkey EXT REF.	Switches monitoring function on or off. <u>*Note:*</u> *If the input is monitored (= ON), the internal OCXO or TCXO has to synchronize to the external reference signal. If this fails a CBIT message will come up.*
13		Press softkey CLK SRC. Select setting.	Selection of the clock source OCXO is recommended.
14		Press softkey REF OUT. Select setting.	Selection of the clock frequency for reference output X11

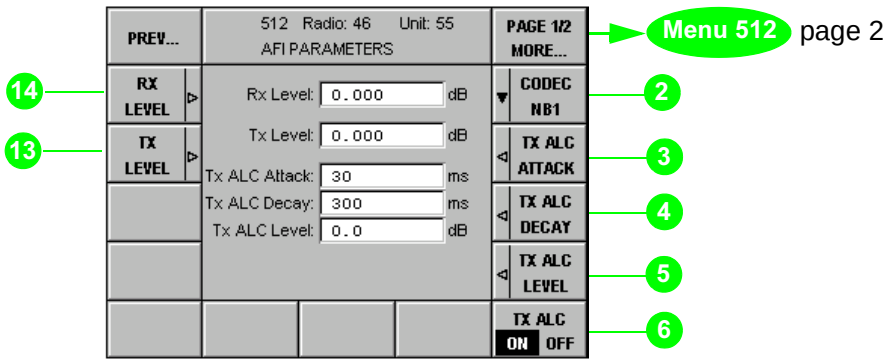
3.7.15 Menu 512, Page 1: AFI PARAMETERS (Audio Frequency Interface)

In this menu the parameters of the Audio Frequency Interface are displayed and edited (page 1 of 2). The default parameters have been selected to allow optimum performance. If, however, changes were made at some point and the operator then wants to re-establish the default settings (see Appendix A1), he only needs to press the Default softkey in Menu 400 (RADIO MAINTENANCE).

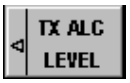
Starting point: Menu 510 (RADIO MODULES)

☞ Press softkey (7) [VIEW FIXED] and select module AUDIO INTERFACE by using the tuning knob.

☞ Press softkey (3) [PARAMS...] and the following display appears:



No.	Control	Action	Notes
2	NB1 / NB2 / WB1 / WB2 — CODEC NB1	Press softkey CODEC. Select setting.	Selection of interface for level setting The Rx level and Tx level are both assigned to the selected NB or WB channel.
3	TX ALC ATTACK	Press softkey TX ALC. Enter value.	Entry of the TX ALC ATTACK time for transmitter AF signals in the range from 10 ms to 100 ms, 30 ms is recommended. Tx ALC Attack: 30 ms *Note:* *Customer-specific settings can be configured, as required.*
4	TX ALC DECAY	Press softkey ALC DECAY. Enter value.	Entry of the ALC DECAY time for transmitter AF signals in the range from 100 ms to 2 000 ms, 300 ms is recommended. Tx ALC Decay: 300 ms *Note:* *Customer-specific settings can be configured, as required.*

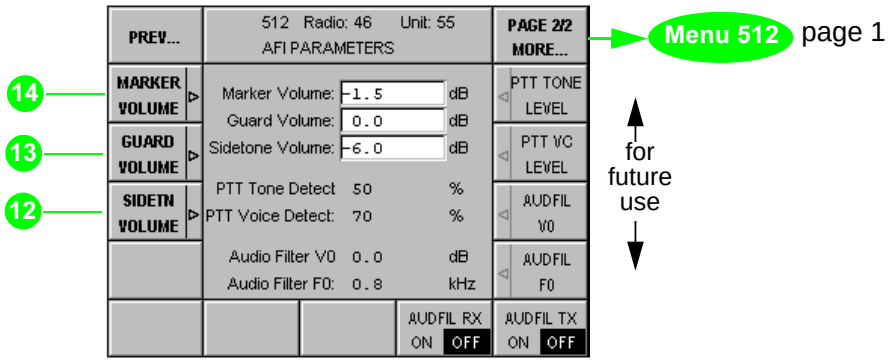
No.	Control	Action	Notes
5		Press softkey TX ALC LEVEL. Enter value.	Entry of the ALC level in the range from -6.5 dB to + 6.5 dB  Output level of TX ALC 0 dB is recommended.
6		Press softkey TX ALC.	Switches the automatic level control (ALC) for transmitter on or off.
13		Press softkey TX LEVEL. Enter value.	Entry of value for audio TX LEVEL into 600 Ω of interfaces NB1 and NB2 in the range from -20 dB to +10 dB  For NB2 and device Link 11 (Menu 565 (DEVICE MAPPING)) the setting range is between -3 and +3 dB. For WB1 and WB2 the setting range is between -3 and +15.5 dB relative to 1.4 V_{pp}. Operation with ALC-TX Setting: Input range for constant modulation depth or FM deviation 0 dBm: -15 to +15 dBm -15 dBm: -30 to 0 dBm
14		Press softkey RX LEVEL. Enter value.	Entry of value for audio RX LEVEL into 600 Ω of interfaces NB1 and NB2 in the range from -20 dB to +10 dB  For NB2 and device Link 11 (Menu 565 (DEVICE MAPPING)) the setting range is between -3 and +3 dB. For WB1 and WB2 the setting range is between -3 and +15.5 dB relative to 1.4 V_{pp}.

3.7.16 Menu 512, Page 2: AFI PARAMETERS (Audio Frequency Interface)

In this menu the parameters of the Audio Frequency Interface are displayed and edited (page 2 of 2). For Default Settings see Appendix A1.

Starting point: Menu 512, page 1

☞ Press softkey (1) [PAGE 1/2 MORE...] and the following display appears:



No.	Control	Action	Notes
12	[SIDETN VOLUME]	Press softkey SIDETN VOLUME. Enter value.	Entry of value for SIDETONE VOLUME in the range from -25.5 dB to 0 dB relative to selected audio Rx level Sidetone Volume: -6.0 dB This is a narrowband voice sidetone available at the audio NB-Rx output and at the headset / loudspeaker.
13	[GUARD VOLUME]	Press softkey GUARD VOLUME. Enter value.	Entry of value for GUARD VOLUME in the range from -25.5 dB to 0 dB Guard Volume: 0.0 dB The Guard Volume is relative to the audio Rx level.
14	[MARKER VOLUME]	Press softkey MARKER VOLUME. Enter value.	Entry of value for MARKER VOLUME in the range from -25.5 dB to 0 dB Marker Volume: -1.5 dB The Marker Volume is relative to the audio Rx level. *Note:* *This setting only makes sense if Cipher Unit KY58 is mapped. The operator is informed via acoustic signal when the transceiver is keyed in plain text mode (V/D UNCP).*

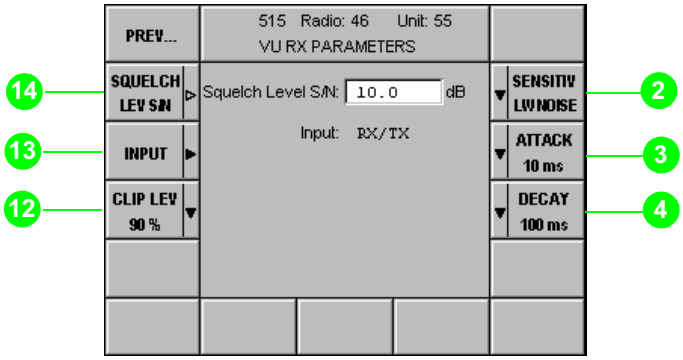
3.7.17 Menu 515: VU RX PARAMETERS

In this menu receiver parameters are displayed and edited. For Default Settings see Appendix A1.

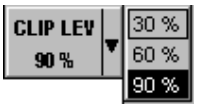
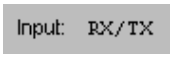
Starting point: Menu 510 (RADIO MODULES)

☞ Select module VU RX (receiver) by using the tuning knob.

☞ Press softkey (3) **PARAMS...** and the following display appears:



No.	Control	Action	Notes
2	LW NOISE / LOW DIST — SENSITIV LW NOISE	Press softkey SENSITIV LW NOISE. Select setting.	Selection of sensitivity **LOW NOISE:** means high sensitivity of receiver **LOW DISTORTION:** means low sensitivity of receiver which is thus less susceptible to interference
3	10 ms / 20 ms / 30 ms / 40 ms / 50 ms / 60 ms / 80 ms / 100 ms — ATTACK 10 ms	Press softkey ATTACK. Select value.	Selection of AF AGC attack time The attack time is the time the receiver needs for controlling the AF output signal to 90% of its nominal output level when the modulation depth has changed from 10% to 90%.
4	100 ms / 200 ms / 300 ms / 500 ms / 700 ms / 1000 ms / 1500 ms / 2000 ms — DECAY 100 ms	Press softkey DECAY. Select value.	Selection of AF AGC decay time The decay time is the time the receiver needs for controlling the AF output signal to its nominal output level when the modulation depth has changed from 90% to 10%.

No.	Control	Action	Notes
12		Press softkey CLIP LEV. Select setting.	Selection of the clipper level This is used for noise clipping after AM voice demodulation. *<u>Note:</u>* *The CLIPPER is switched on and off by using softkey 6 in Menu 110, page 2 (MANUAL FIX.FRQ).*
13		Press softkey INPUT. Select setting.	Selection of antenna input  When the common RX/TX antenna of a transceiver is to be used select RX/TX. *<u>Note:</u>* *In conjunction with Antenna Interface GI 4403 and without UHF Filter FD 4430 select RX, in all other cases RX/TX input.*
14		Press softkey SQUELCH LEV S/N. Set value.	Setting the response threshold of the S/N squelch in the range from 6 to 20 dB (only effective with Narrowband Voice) 

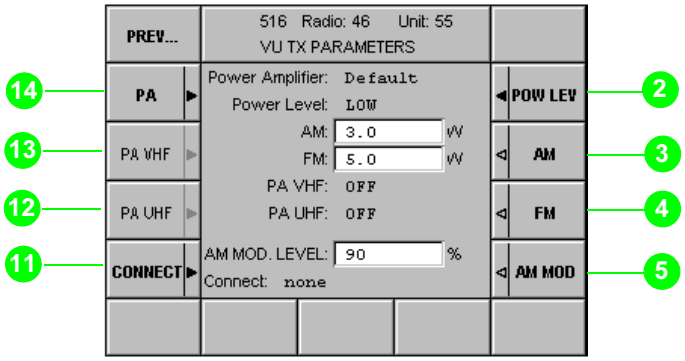
3.7.18 Menu 516: VU TX PARAMETERS

In this menu the transmitter parameters are displayed and edited. For Default Settings and Connection of Peripheral Equipment see Appendix A1.

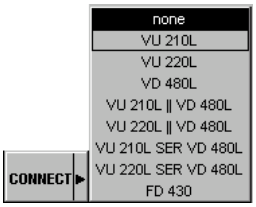
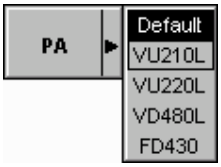
Starting point: Menu 510 (RADIO MODULES)

☞ Press softkey (7) tuning knob. [VIEW FIXED] and select module VU POWER AMPLIFIER by using the

☞ Press softkey (3) [PARAMS...] and the following display appears:



No.	Control	Action	Notes
2	LOW / MED / HIGH ◄ POW LEV	Press softkey POW LEV. Select setting.	Selection of edit fields for power levels **LOW:** editing the value for low power level **MEDIUM:** editing the value for medium power level **HIGH:** editing the value for high power level
3	◁ AM	Press softkey AM. Set value.	Setting the AM transmit power (for LOW, MEDIUM, HIGH) AM: 3.0 W For AM the power level (carrier unmodulated) can be set to values from 1 to 30 W.
4	◁ FM	Press softkey FM. Set value.	Setting the FM transmit power (for LOW, MEDIUM, HIGH) FM: 5.0 W For FM the power level can be set to values from 1 to 100 W.
5	◁ AM MOD	Press softkey AM MOD. Set value.	Setting the AM modulation depth in the range from 10 to 99%, 90% is recommended. AM MOD. LEVEL: 90 %

No.	Control	Action	Notes
11		Press softkey CONNECT. Select setting.	Defines whether an external power amplifier is connected at X. 4410A or X. 4460A and selects its type: **VU 210L:** for future use **VU 220L:** for future use **VD 480L:** UHF Amplifier 100 W AM **VU 210L // VD 480L:** for future use **VU 220L // VD 480L:** for future use **VU 210L SER VD 480L:** for future use **VU 220L SER VD 480L:** for future use **FD 430:** UHF Agile Filter See Appendix A1, Connection of Peripheral Equipment.
12		Press softkey PA UHF.	Activates / deactivates operation with the connected UHF amplifier. The power amplifier can be activated via software at one of the power levels LOW, MED, and HIGH.
13		Press softkey PA VHF.	Activates / deactivates operation with the connected VHF amplifier. The power amplifier can be activated via software at one of the power levels LOW, MED, and HIGH.
14		Press softkey PA. Select setting.	Selection of the configuration of the power level for the external power amplifier **Default:** selects power level (LOW, MED, HIGH) for use of X. 4410A or X. 4460A without power amplfier **VU 210L:** for future use **VU 220L:** for future use **VD 480L:** UHF Amplifier 100 W AM **FD 430:** UHF Agile Filter See Appendix A1, Connection of Peripheral Equipment.

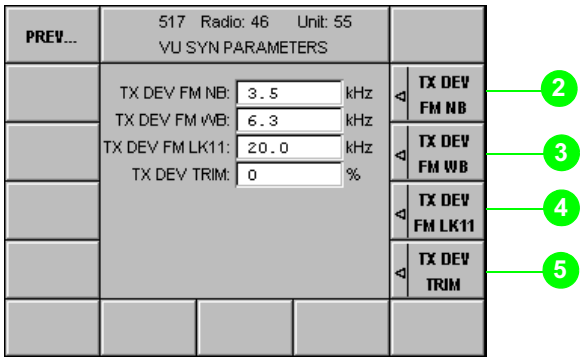
3.7.19 Menu 517: VU SYN PARAMETERS

In this menu the synthesizer parameters are displayed and edited. As the default settings have been configured for optimum performance, changing them will not be necessary in most cases. For Default Settings see Appendix A1.

Starting point: Menu 510 (RADIO MODULES)

☞ Select module VU SYN (synthesizer) by using the tuning knob.

☞ Press softkey (3) [PARAMS...] and the following display appears:



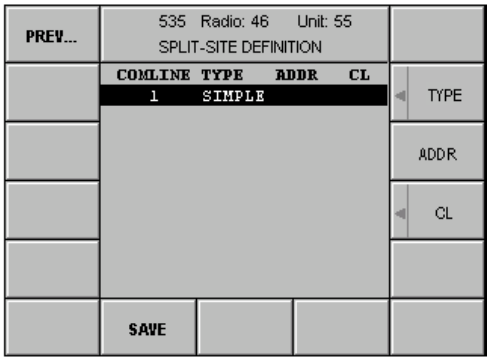
No.	Control	Action	Notes
2	[TX DEV FM NB]	Press softkey TX DEV FM NB. Set value.	Setting the value for FM Deviation Narrowband in the range from 1 kHz to 20 kHz, 3.5 kHz is recommended. TX DEV FM NB: 3.5 kHz
3	[TX DEV FM WB]	Press softkey TX DEV FM WB. Set value.	Setting the value for FM Deviation Wideband (analog) in the range from 1 kHz to 20 kHz, 6.25 kHz is recommended. TX DEV FM WB: 6.3 kHz
4	[TX DEV FM LK11]	Press softkey TX DEV FM LK11. Set value.	Setting the value for TX Deviation for Link 11 operation in the range from 1 kHz to 20 kHz, 20 kHz is recommended. TX DEV FM LK11: 20.0 kHz
5	[TX DEV TRIM]	Press softkey TX DEV TRIM. Set value.	Setting the value for fine tuning of synthesizer FM modulator in the range from -30% to 30% TX DEV TRIM: 0 % This setting is effective for all analog procedures, not for Wideband Data Digital FSK.

3.7.20 Menu 535: SPLIT SITE DEFINITION

Note:
Not used in this application!

Starting point: Menu 400, page 2 (RADIO MAINTENANCE)

☞ Press softkey (3) **SPLIT SITE ...** and the following display appears:



3.7.21 Menu 550: PTT COMLINE MAPPING

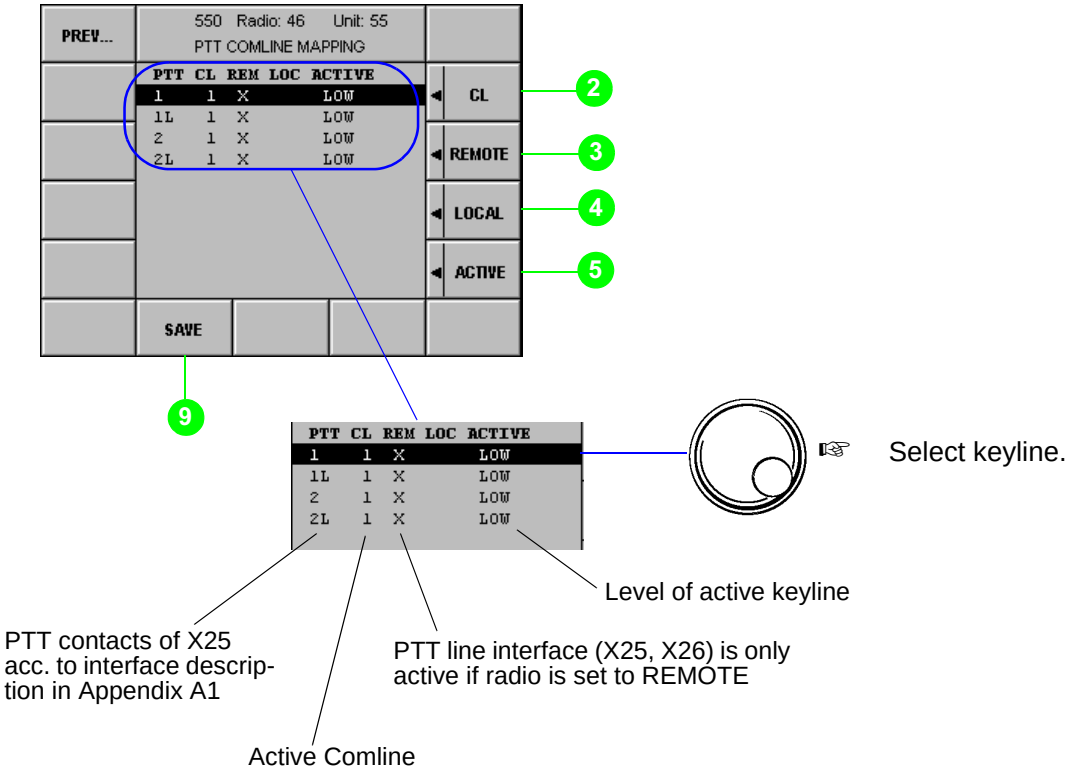
Note:

We recommend not to configure the keylines for local mode, as this may result in unwanted carrier activation by one of the connected devices.

In this menu the assignment of PTT lines to radio Comlines is displayed and edited. For Default Settings See Appendix A1.

Starting point: Menu 400, page 2 (RADIO MAINTENANCE)

☞ Press softkey (14) [PTT MAPPING...] and the following display appears:



No.	Control	Action	Notes
2	none 1 CL	Press softkey CL. Select setting.	Selection of communication line for PTT mapping
3	REMOTE	Press softkey REMOTE.	Selection of the active PTT line An "X" then indicates that this line can be selected by remote control only. REMOTE means that the PTT line can be operated only in remote control but not in local control.

No.	Control	Action	Notes
4		Press softkey LOCAL.	Selection of the active PTT line An "X" then indicates that this line can be selected by local control only. The PTT line is only enabled if the radio is set to LOCAL operation (key on Front Panel).
5		Press softkey ACTIVE.	Selection of the PTT level of the current line
9		Press softkey SAVE.	Saves the current configuration. The asterisk (*) indicates that the new settings have not yet been stored.

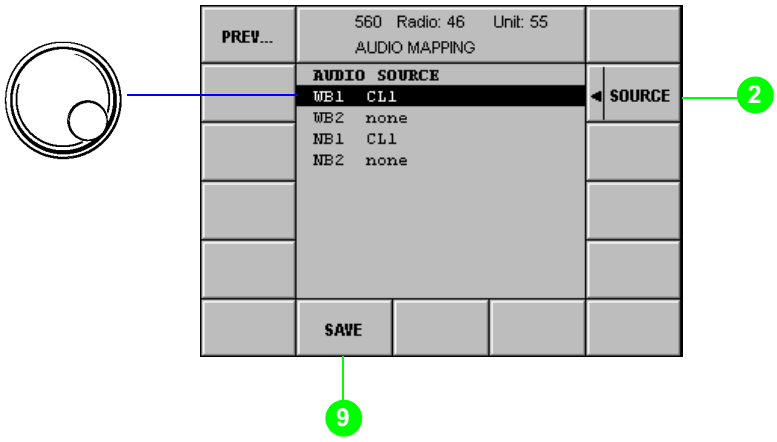
3.7.22 Menu 560: AUDIO MAPPING

In this menu the assignment of audio channels to Comlines is displayed and edited.

Starting point: Menu 400, page 2

☞ Press softkey (12) [AUDIO MAPPING...] and the following display appears:

☞ Select audio line



NB: Voice info
WB: Data info

No.	Control	Action	Notes
2	none / CL1 / Guard ◄ SOURCE	Press softkey SOURCE. Select setting.	Assigns the selected audio port to the Comline. **CL1:** Audio port is dedicated to Comline CL1 modules. In communication mode V/D UNCP any AF signal from the guard receiver will be added to the narrowband interface if the mixer is switched on via softkey GUARD (Menus 110 / 210). **GUARD:** Audio port is exclusively for AF signals from the guard receiver. Any AF signal from the guard receiver will be output at the NB2 port in all communication modes. *Note:* *We recommend to switch on the mixer via softkey GUARD (Menus 110 / 210) for both AF signals (VHF and UHF). This guarantees the AF signal output from the guard receiver in all communication modes.*
9	SAVE *	Press softkey SAVE.	Saves the current configuration. The asterisk (*) indicates that the new settings have not yet been stored.

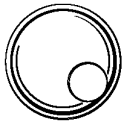
3.7.23 Menu 565: DEVICE MAPPING

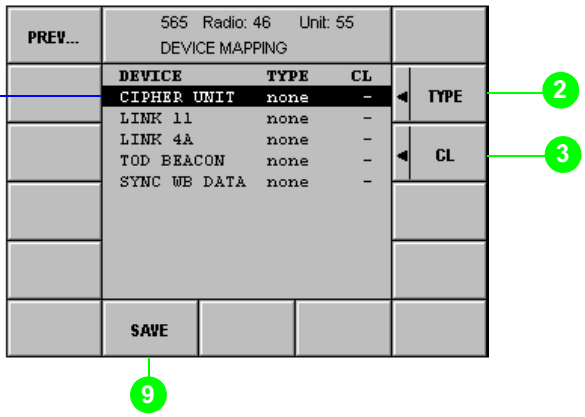
In this menu the assignment of radio configurations (e.g. Link 11) to Comlines is displayed and edited.

Starting point: Menu 400, page 2 (RADIO MAINTENANCE)

☞ Press softkey (11) [DEVICE MAPPING...] and the following display appears:

☞ Select device





Note:

LINK 4A and TOD BEACON are for future use.

No.	Control	Action	Notes
2	none / KY58BB / KY58DP ◄ TYPE	Press softkey TYPE. Select setting.	Defines the type of a selected radio configuration. At present, this function is available with cipher units only. **KY58BB** = Baseband mode **KY58DP** = Diphase mode
3	none / 1 ◄ CL	Press softkey CL. Select setting.	Assigns the selected device to a Comline.
9	SAVE *	Press softkey SAVE.	Saves the current configuration. The asterisk (*) indicates that the new settings have not yet been stored.

Note:

- *As a result of device mapping all the relevant radio settings such as resource assignment, internal signal processing etc. are made.*
- *When the external device has been connected to the Comline, be absolutely sure to switch the radio off and on again.*
- *After switch-on check if audio line (Menu 560 (AUDIO MAPPING)) and keyline (Menu 550 (PTT COMLINE MAPPING)) have been mapped correctly.*
- *CAUTION: When removing the external device from the Comline, all previously used resources will become free again. Therefore always check both audio mapping (Menu 560) and PTT mapping (Menu 550).*

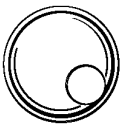
3.7.24 Menu 570: SQUELCH POLARITY

In this menu the polarity of the squelch signal output level is displayed and edited.

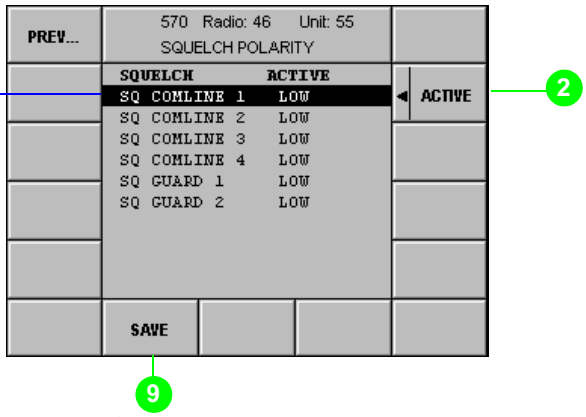
Starting point: Menu 400, page 2 (RADIO MAINTENANCE)

☞ Press softkey (10) [SQUELCH... POLARITY] and the following display appears:

☞ Select squelch



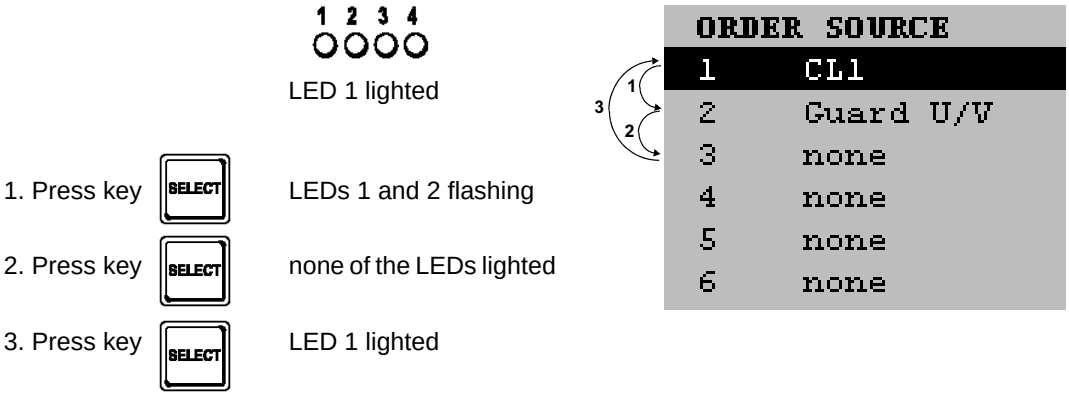
Active level:
High - positive polarity
Low - level 0 V



No.	Control	Action	Notes
2	◄ ACTIVE	Press softkey ACTIVE.	The active polarity is switched from low to high and vice versa: SQ COMLINE 2 LOW
9	SAVE *	Press softkey SAVE.	Saves the current configuration. The asterisk (*) indicates that the new settings have not yet been stored.

3.7.25 Menu 575: FRONTPANEL AUDIO SOURCE

By using the SELECT key one of the AF sources for the loudspeaker can be selected that have been configured in Menu 575, e.g. CL1 or Guard U/V.



When CL1 is selected as AF source and communication mode V/D UNCP is active, the guard receiver AF signal can be output at the loudspeaker in addition to the main receiver AF signal, depending on the GUARD configuration (see Menu 110 (MANUAL FIX.FRQ), page 1 and Menu 210, page 1 (USER PRESET FIX.FRQ)).

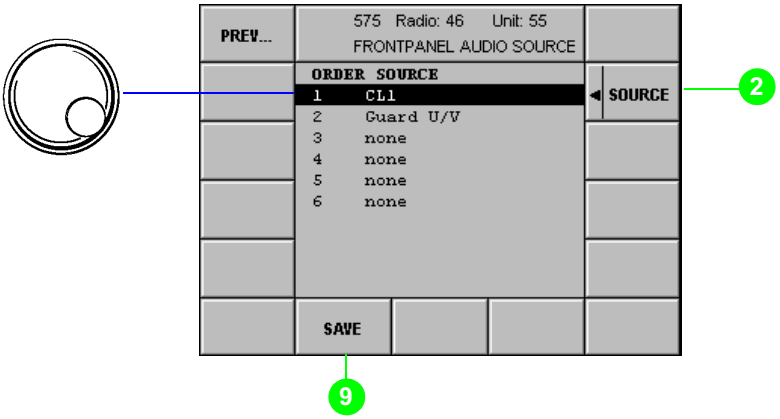
The following table shows how LEDs 1 and 2 are related and which AF signal is output by the loudspeaker.

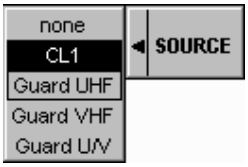
LED 1	LED 2	AF signal
		no AF signal
lighted		AF signal of main receiver and in addition of guard receiver, if switched on via softkey GUARD in Menu 110 (MANUAL FIX.FRQ) or 210 (USER PRESET FIX.FRQ).
flashing		AF signal of guard receiver (VHF band)
	flashing	AF signal of guard receiver (UHF band)
flashing	**flashing**	AF signal of guard receiver (VHF and UHF bands)

Starting point: Menu 400, page 2 (RADIO MAINTENANCE)

☞ Press softkey (9) **AUDIO FRONTP ...** and the following display appears:

☞ Select audio source



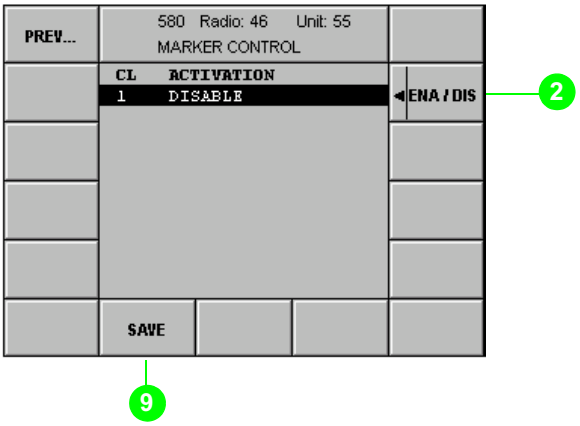
No.	Control	Action	Notes
2		Press softkey SOURCE. Select setting.	Assigns the Comline or guard receiver to the audio output at the Front Panel (loudspeaker, headset connector X7).
9		Press softkey SAVE.	Saves the current configuration. The asterisk (*) indicates that the new settings have not yet been stored.

3.7.26 Menu 580: MARKER CONTROL

In this menu the marker for the selected Comline is enabled or disabled.

Starting point: Menu 400, page 2 (RADIO MAINTENANCE)

☞ Press softkey (7) MARKER ... CONTROL and the following display appears:



No.	Control	Action	Notes
2		Press softkey ENA/DIS.	Enables or disables the PLAIN marker function. The marker tone itself is switched on in Menu 110 (MANUAL FIX.FRQ) or 210 (USER PRESET FIX.FRQ). *Note:* *The marker tone is to be used only if Cipher Unit KY58 is mapped.*
9		Press softkey SAVE.	Saves the current configuration. The asterisk (*) indicates that the new settings have not yet been stored.

3.7.27 Menu 600: RADIO SETUP

Via the Radio Setup menus the PRESET PAGES (LOADED PAGES) are edited and stored.

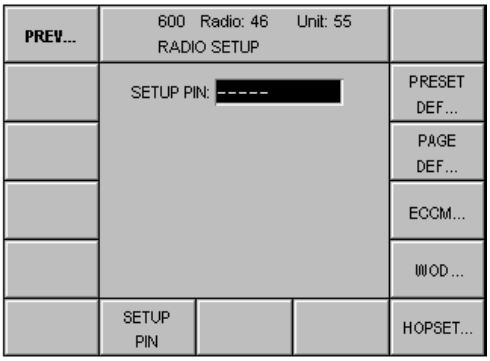
One PRESET consisting of up to 200 Pages can be stored in the radio. Alternatively, the PRESET may also be split up into two PRESETs with 100 Pages each.

Each PRESET PAGE is made up of a fixed frequency and an EPM section (not used in this application). When a PRESET PAGE is called up in PRESET mode, one of these sections is activated and the radio is set accordingly. Which section is to be activated in each case is defined in the DEFAULT MODE setting, to be made in Menu 710.

Page storage within the radio is based on a redundancy concept. For more details on Loaded, User and Current Pages see chapter 3.5.

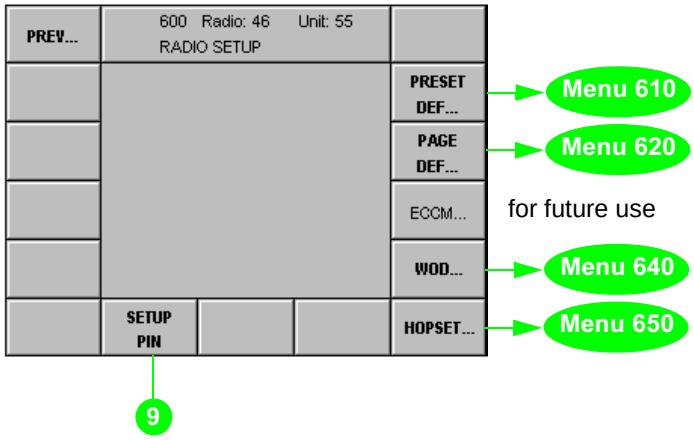
Starting point: Menu 040 (MAIN)

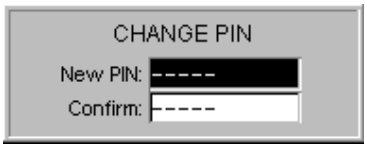
☞ Press softkey (5) **SETUP...** and the following display appears:



☞ Enter setup PIN number (5 digits) by using the numerical keypad, then press ENTER.

❑ The following display appears:



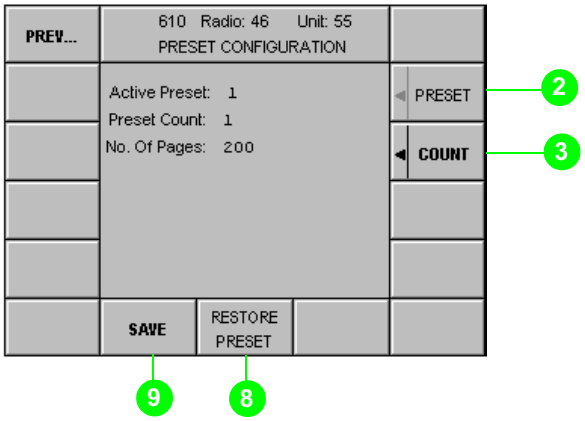
No.	Control	Action	Notes
9	**SETUP PIN**	Press softkey SETUP.	Entry of a new setup PIN.  1. Enter the new PIN by using the numerical keypad, then press ENTER. 2. Confirm the new PIN by repeating the entry using the numerical keypad, then press ENTER. See also chapter 3.6.
	SETUP PIN	Abort entry.	

3.7.28 Menu 610: PRESET CONFIGURATION

In this menu the Preset configuration is displayed and edited.

Starting point: Menu 600 (RADIO SETUP)

☞ Press softkey (2) **PRESET DEF...** and the following display appears:



Note:

In Radio session softkeys PRESET, COUNT and SAVE are enabled. In Comline session softkey RESTORE PRESET is enabled.

A Preset may consist of 200 or 2 x 100 Preset Pages.

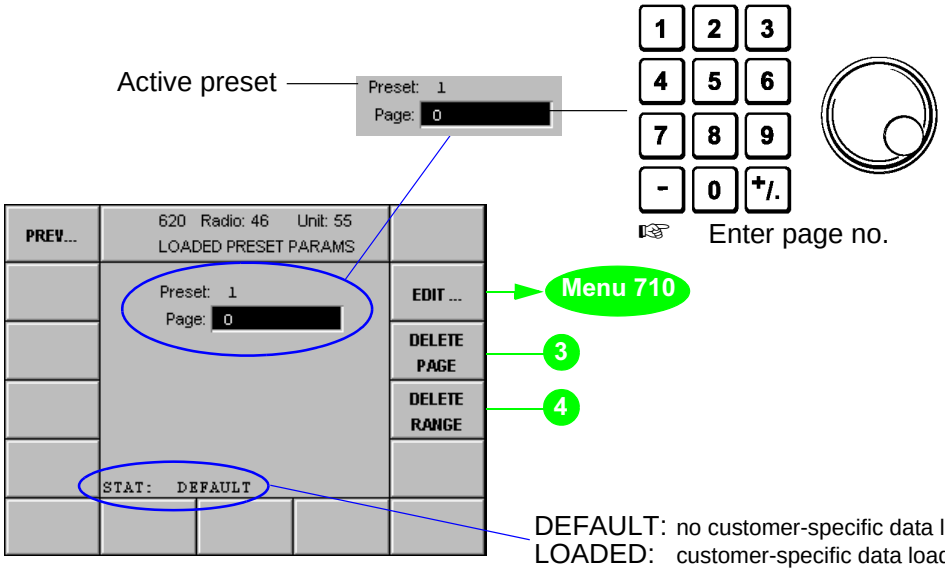
No.	Control	Action	Notes
2	PRESET	Press softkey PRESET.	Switches between two active Presets. Active Preset: 1 *Note:* *Switching over between Preset 1 and 2 is only possible if Count 2 (2 x 100 pages) is selected. So softkey PRESET is enabled with preset count = 2.*
3	COUNT	Press softkey COUNT.	Switches between two preset counts. Preset Count: 1 Count 2 is for 2 x 100 pages and Count 1 is for 200 pages.
8	RESTORE PRESET	Press softkey RESTORE PRESET.	Restores the Preset configuration stored in the radio. The Preset data are copied from the Loaded Presets into the User Presets.
9	SAVE *	Press softkey SAVE.	Saves the current configuration. The asterisk (*) indicates that the new settings have not yet been stored.

3.7.29 Menu 620: LOADED PAGE PARAMETERS

In this menu the individual LOADED PAGES can be selected and deleted.

Starting point: Menu 600 (RADIO SETUP)

☞ Press softkey (3) [PAGE DEF...] and the following display appears:



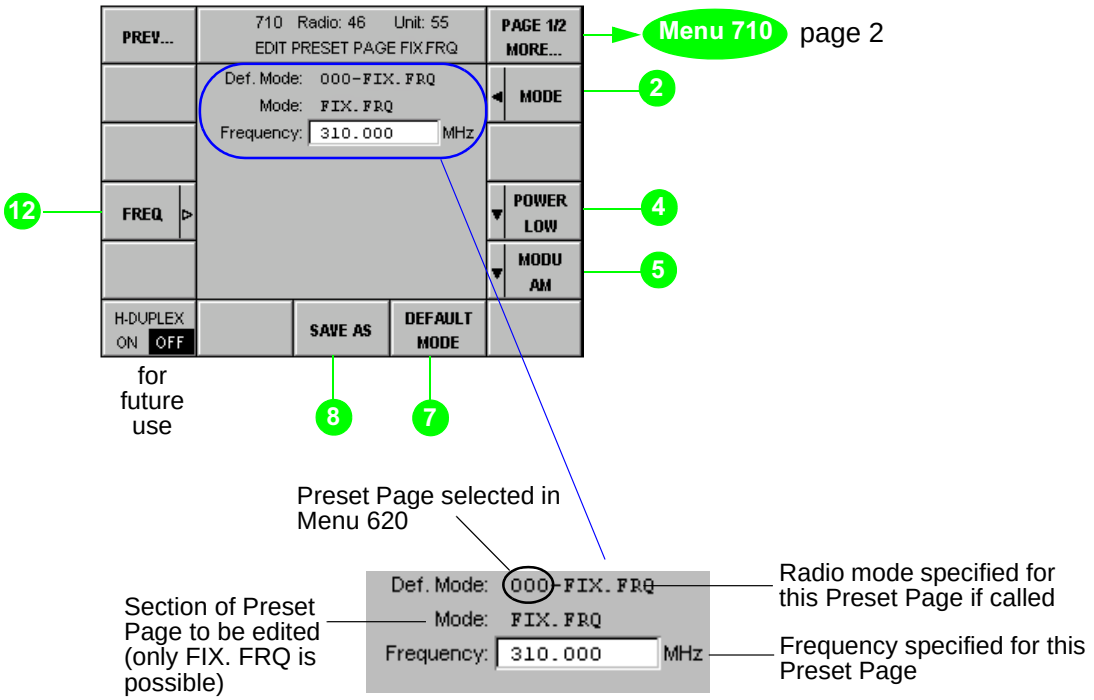
No.	Control	Action	Notes
3	[DELETE PAGE]	Press softkey DELETE PAGE.	Deletes specified page. Press enter to delete Page: 0
	[DELETE PAGE]	Abort entry.	User-defined settings in the selected Preset Page are replaced by default values (see Default Settings in Appendix A1).
4	[DELETE RANGE]	Press softkey DELETE RANGE.	Deletes from page xxx to page yyy. DELETE RANGE From: --- To: --- PRESS ENTER
	[DELETE RANGE]	Abort entry.	The user-defined settings in the pages of the specified range are deleted. 1. Enter start number by using the numerical keypad, then press ENTER. 2. Enter stop number by using the numerical keypad, then press ENTER.

3.7.30 Menu 710, Page 1: EDIT PRESET PAGE FIX.FRQ (Fixed Frequency)

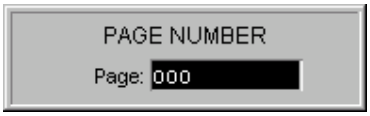
In this menu the settings of a Preset Page selected in Menu 620 (LOADED PRESET PARAMS) are displayed, edited and stored (page 1 of 2).

Starting point: Menu 620 (LOADED PRESET PARAMS)

☞ Press softkey (2) [EDIT...] and the following display appears:



No.	Control	Action	Notes
2	FIX.FRQ / MODE	Press softkey MODE.	Selection of the section of the Preset Page to be edited or viewed **FIX.FRQ:** only FIX. FRQ is possible
4	OFF / LOW / MED / HIGH / POWER HIGH	Press softkey POWER. Select setting.	Selection of transmit power **OFF:** Tx is switched off **LOW:** Tx is set to low power **MEDIUM:** Tx is set to medium power **HIGH:** Tx is set to high power ➢ Exact levels in W are defined in Menu 516 (VU TX PARAMETERS).
5	AM / FM / MODU AM	Press softkey MODU. Select setting.	Selection of modulation type **AM:** amplitude modulation **FM:** frequency modulation

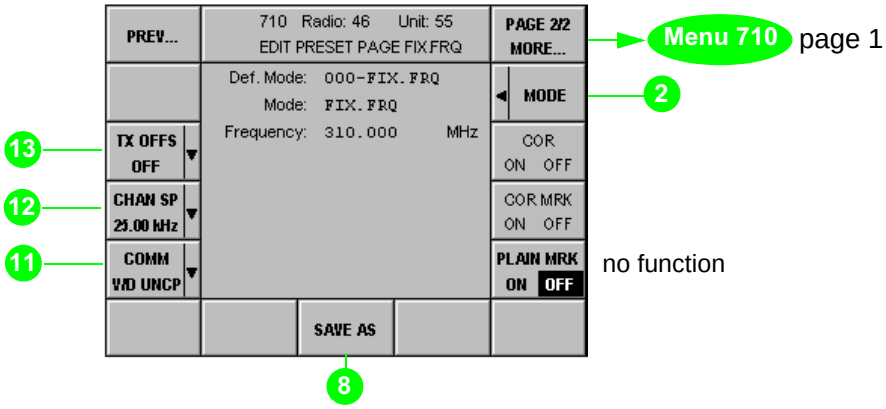
No.	Control	Action	Notes
7	DEFAULT MODE	Press softkey DEFAULT MODE.	Selection of the radio operation mode to be set, if this Preset Page is called up.
8	SAVE AS SAVE AS *	Press softkey SAVE AS. Set value. Press softkey SAVE AS.	Saves the edited PRESET PAGE under a new PRESET number.  Range of values: 0 to 199 The asterix (*) indicates that the new settings have not yet been stored.
12	FREQ ▷	Press softkey FREQ. Set value.	Setting the frequency in the range from ❑ 100 to 512 MHz (VHF/UHF transceiver) or ❑ 100 to 173.9875 MHz (VHF transceiver) or ❑ 225 to 399.9875 MHz (UHF transceiver) 

3.7.31 Menu 710, Page 2: EDIT PRESET PAGE FIX.FRQ (Fixed Frequency)

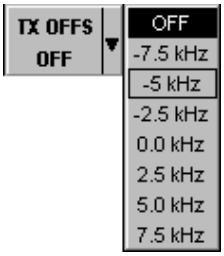
In this menu the settings of a Preset Page selected in Menu 620 (LOADED PRESET PARAMS) are displayed, edited and stored (page 2 of 2).

Starting point: Menu 710, page 1

☞ Press softkey (1) **PAGE 1/2 MORE...** and the following display appears:



No.	Control	Action	Notes
2	FIX.FRQ / MODE		See chapter 3.7.30, softkey 2.
8	SAVE AS		See chapter 3.7.30, softkey 8.
11	COMM V/D UNCPH; V/D UNCPH, V/D CPH, WB ANALOG, WB DIGITAL BB, WB DIGITAL DP, LINK 11, DAMA	Press softkey COMM. Select setting.	Selection of a pre-defined communication mode *Note:* *When a communication mode not supported by the radio (SW option missing, device mapping) is set via the Preset Pages, communication mode V/D UNCP will be activated by default.*
12	CHAN SP 25.00 kHz; 8.33 kHz, 12.50 kHz, 25.00 kHz	Press softkey CHAN SP. Select setting.	Selection of the channel spacing

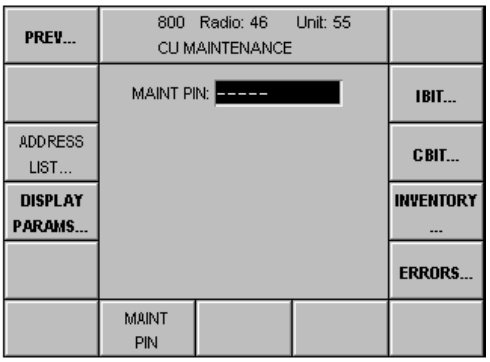
No.	Control	Action	Notes
13		Press softkey TX OFFS. Select value.	Selection of the Tx offset value See Menu 110, page 2 (MANUAL FIX.FRQ).

3.7.32 Menu 800: CU MAINTENANCE

In this menu the hardware and software parameters of the Control Unit GB 4000C are displayed and edited.

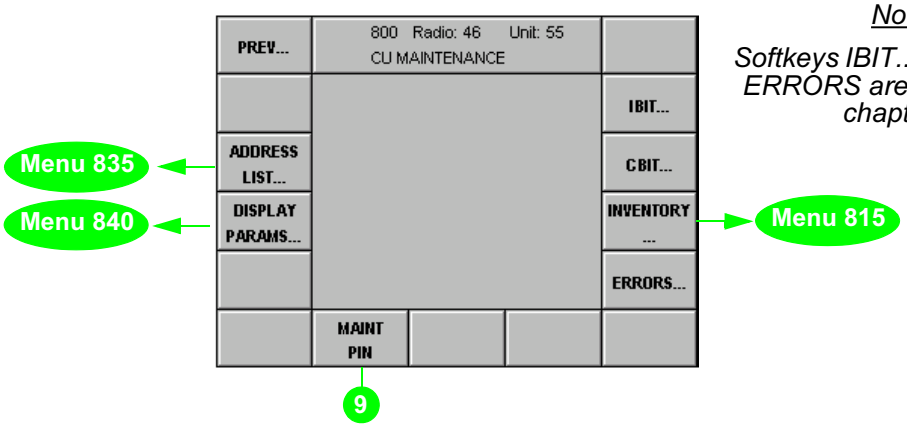
Starting point: Menu 040 (MAIN)

☞ Press softkey (6) [CU... MAINT] and the following display appears:



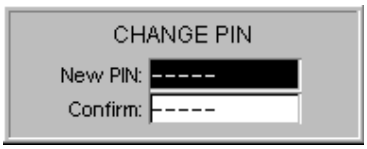
☞ Enter control unit maintenance PIN number (5 digits) by using the numerical keypad, then press ENTER.

❑ The following display appears:



Note:

Softkeys IBIT..., CBIT... and ERRORS are described in chapter 4.

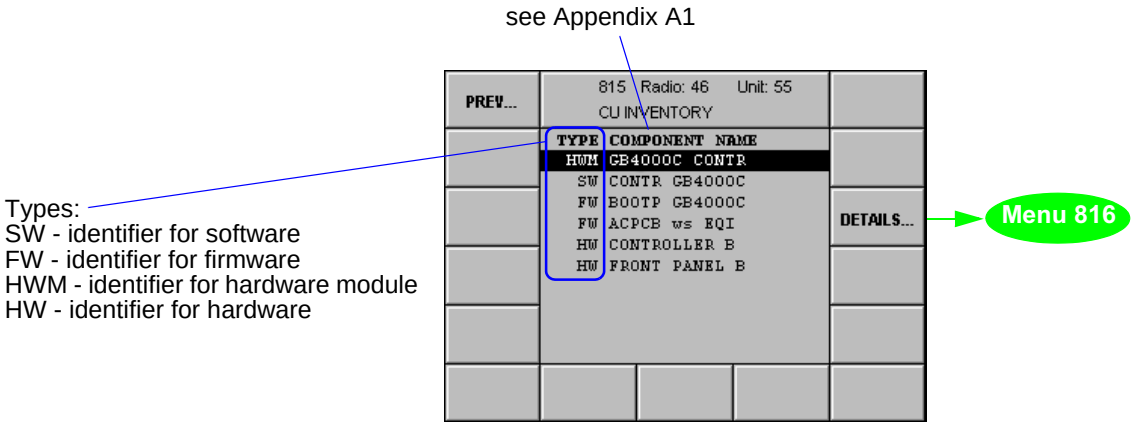
No.	Control	Action	Notes
9	[MAINT PIN]	Press softkey MAINT PIN.	Entry of a new maintenance PIN  1. Enter the new PIN by using the numerical keypad, then press ENTER. 2. Confirm the new PIN by repeating the entry using the numerical keypad, then press ENTER. See also chapter 3.6.
	[MAINT PIN]	Abort entry.	

3.7.33 Menu 815: CU INVENTORY

This menu gives an overview of the hardware, software and firmware components installed in the control unit.

Starting point: Menu 800 (CU MAINTENANCE)

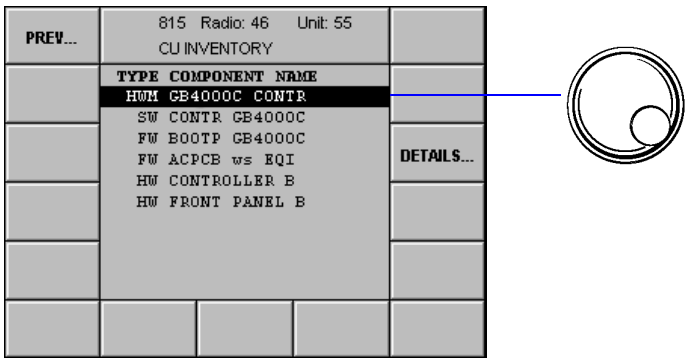
☞ Press softkey (4) **INVENTORY** and the following display appears:



3.7.34 Menu 816: CU INVENTORY DETAILS

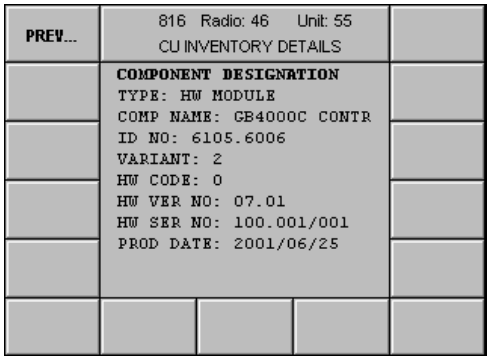
This menu shows details about a component.

Starting point: Menu 815 (CU INVENTORY)



☞ Select component.

☞ Press softkey (3) DETAILS... and the following display appears (example):



The data for the component selected in Menu 815 comprise the following:

- Type (hardware, software, firmware)
- Name of module or software
- Ident. No.
- Variant
- Code No.
- Version No.
- Serial No.
- Production Date

3.7.35 Menu 835: RADIO ADDRESS LIST

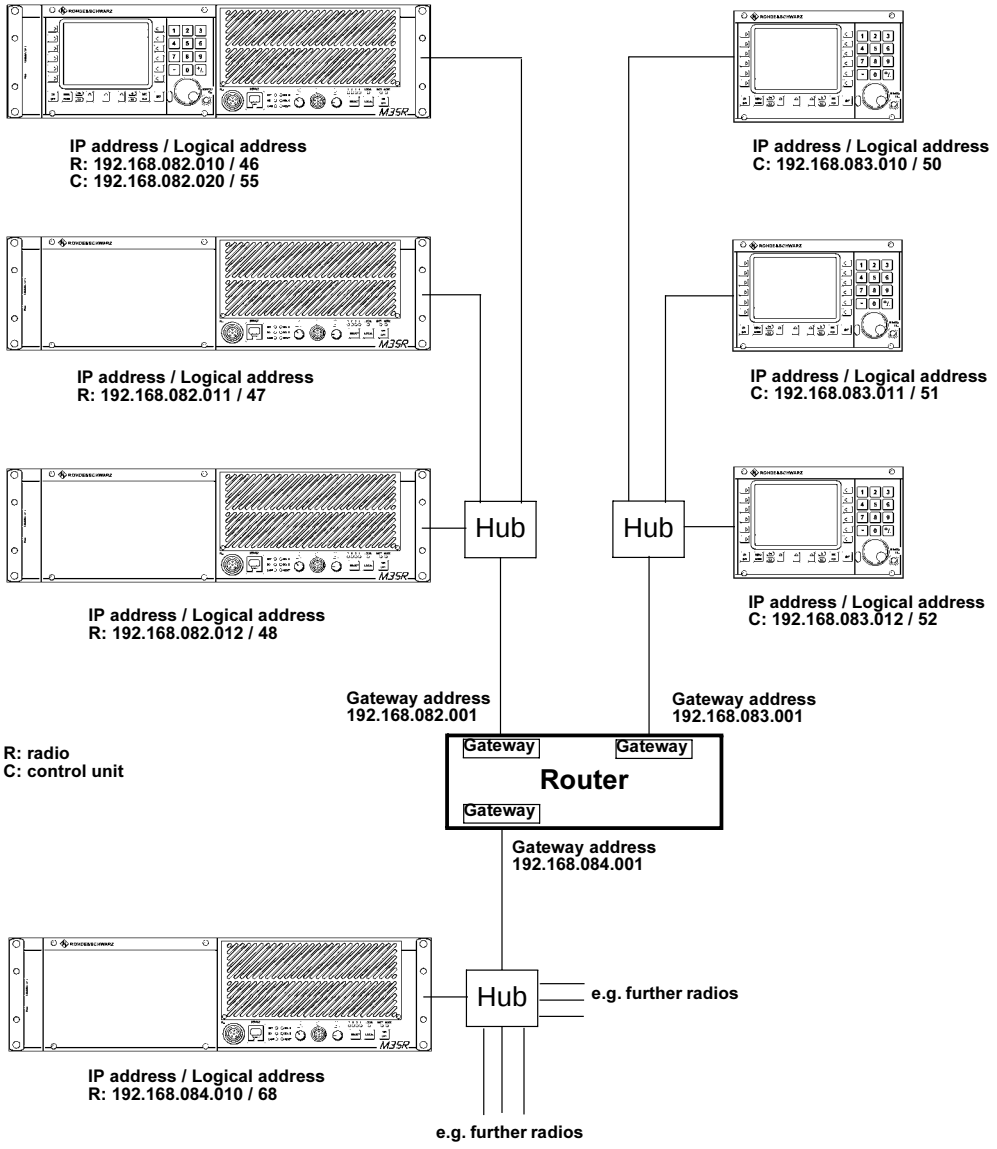


Fig. 3.7 Example of a Network with Router

For addressing the M3SR devices the Internet Protocol (IP) is used. Therefore a unique IP address needs to be assigned to each device, permitting the device to be identified and addressed without ambiguity. In addition, each device needs a freely selectable logical address in the range from 000 to 999, which is the address to be entered in Menu 010 (RADIO CONNECTION) for addressed operation. The logical address spares the operator the tedious task of entering the complex IP addresses.

Via Menu 835, the addresses (logical and IP addresses) of devices other than one's own can be entered or deleted. When entering the IP address please observe the IETF (= Internet Engineering Task Force) standards (RFC pages = request for comments). In compliance with RFC1918, the following IP address ranges are reserved for private networks:

- ❑ 10.0.0.0 to 10.255.255.255, associated subnet mask 255.0.0.0
- ❑ 172.16.0.0 to 172.31.255.255, associated subnet mask 255.255.0.0
- ❑ 192.168.0.0 to 192.168.0.255, associated subnet mask 255.255.255.0

The subnet mask defines the respective address parts for network address and local address.

	Network address			Local address
Subnet mask	255	255	255	0
IP addresses	192	168	0	0
	:	:	:	:
	192	168	0	255

max. 256 units
0 reserved for network
255 reserved for broadcast

Note:

- *IP addresses 0.0.0.0 and 255.255.255.255 are not permitted to be used.*
- *For the net infrastructure, e.g. router, we recommend to use the lower local addresses.*

Menu 835 displays all stored addresses. In Menu 010 (CU ADDRESS ROUTE) only those devices can be selected to set up a link, which figure in the address list and which in column 'G' are not marked with a '-' (wrong configuration, see Menu 836).

When a radio is selected whose network address (e.g. 192.168.**082**.010) differs from the control unit network address (e.g. 192.168.**083**.011), the link is set up via the router.

Example:

1. Defining the subnet mask

   - depending on the number of networks and devices per network (up to 256 networks with max. 253 devices per network => 255.255.255.000)

2. Defining the logical addresses and IP addresses

   - Select a logical address that clearly identifies the particular device and is easy to remember.

Logical	Associated IP = Address	network + local	
46	192.168.082.010	192.168.082	010
47	192.168.082.011	192.168.082	011
48	192.168.082.012	192.168.082	012
50	192.168.083.010	192.168.083	010
51	192.168.083.011	192.168.083	011
52	192.168.083.012	192.168.083	012
55	192.168.082.020	192.168.082	020
68	192.168.084.010	192.168.084	010

   - The logical and the local address may be identical.

3. Defining the gateway addresses

   - For each local network a gateway address is required (192.168.082.001, 192.168.083.001 and 192.168.084.001).

   - For the local address always use "1".

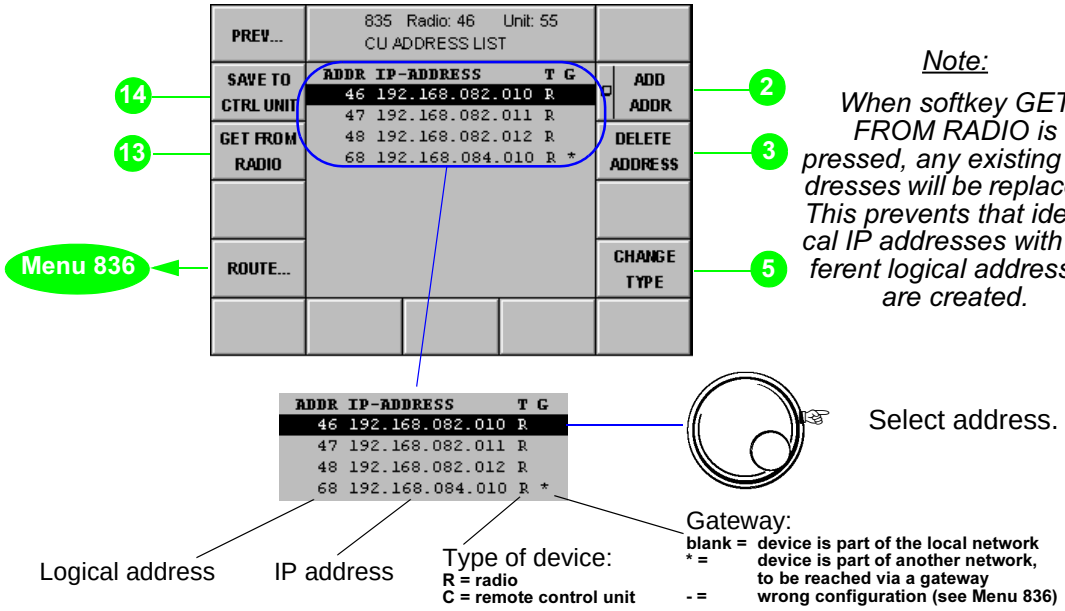
4. Entering the logical addresses and IP addresses for those radios that are to be linked up to

   - We recommend to also enter the logical addresses and IP addresses of the control units, because this will inhibit these addresses for radios and prevent multiple address allocation.

5. Entering the own address, subnet mask and gateway address in Menu 836 (CU ADDRESS ROUTE)

Starting point: Menu 800, page 1 (CU MAINTENANCE)

☞ Press softkey (13) ADDRESS LIST... and the following display appears:



No.	Control	Action	Notes
2	ADD ADDR	Press softkey ADD ADDR. Enter	Adds address to the address list. Entry of logical address and IP address for another device: ADDR IP-ADDRESS --- ---.---.---.---
3	DELETE ADDRESS DELETE ADDRESS	Press softkey DELETE ADDRESS. Abort process.	Deletes the selected address. Press enter to delete Addr: 2 IP: 192.168.102.003
5	CHANGE TYPE	Press softkey CHANGE TYPE.	Switches over between radio and controller (control unit).
13	GET FROM RADIO	Press softkey GET FROM RADIO.	Retrieves an address list from the assigned radio (see also Menu 435 (RADIO ADDRESS LIST)). In this way the control unit obtains all addresses stored in the radio.
14	SAVE TO * CTRL UNIT	Press softkey SAVE TO CTRL UNIT.	Saves address list to the control unit. The asterisk (*) indicates that the new settings have not yet been stored.

3.7.36 Menu 836: CU ADDRESS ROUTE

Via Menu 836 the own address (logical and IP address) can be entered. When specifying the Subnet Mask and the IP addresses (own and Gateway), please observe the IETF standards (RFC pages), in particular:

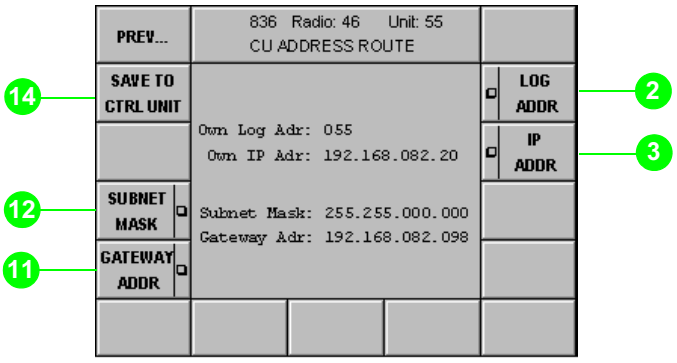
- ❑ 796: Address Mappings
- ❑ 940: Toward an Internet Standard Scheme for Subnetting
- ❑ 950: Internet Standard Subnetting Procedure
- ❑ 1219: On the Assignment of Subnet Numbers
- ❑ 1517: Applicability Statement for the Implementation of Classless Inter-Domain Routing
- ❑ 1519: Classless Inter-Domain Routing: an Address Assignment and Aggregation Strategy
- ❑ 1918: Address Allocation for Private Internets

In compliance with RFC1918 the following address ranges are reserved for private networks:

- ❑ 10.0.0.0 to 10.255.255.255, associated subnet mask 255.0.0.0
- ❑ 172.16.0.0 to 172.31.255.255, associated subnet mask 255.255.0.0
- ❑ 192.168.0.0 to 192.168.255.255, associated subnet mask 255.255.255.0

Starting point: Menu 835 (CU ADDRESS LIST)

☞ Press softkey (11) **ROUTE...** and the following display appears:



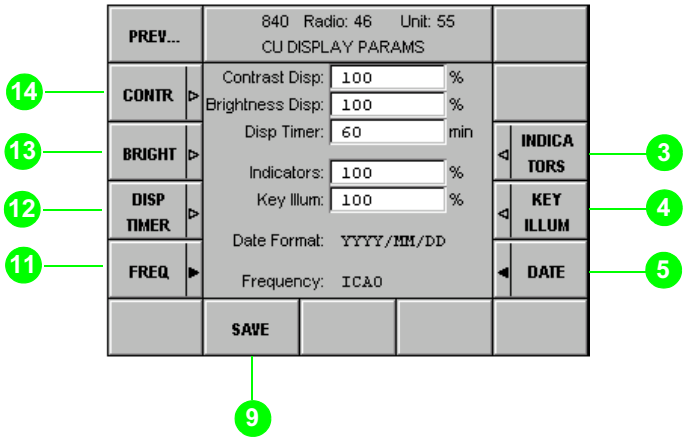
No.	Control	Action	Notes
2		Press softkey LOG ADDR. Change value.	Changing the own logical address:  Range of values: 001 to 999
3		Press softkey IP ADDR Change value.	Changing of the own IP address: 
11		Press softkey GATEWAY ADDR. Change value.	Changing the gateway address:  *Note:* *Entry of 000.000.000.000 deletes an existing gateway address.*
12		Press softkey SUBNET MASK. Change value.	Changing the subnet mask: 
14		Press softkey SAVE TO CTRL UNIT.	Saves address list to the control unit. The asterisk (*) indicates that the new settings have not yet been stored.

3.7.37 Menu 840: CU DISPLAY PARAMS

In this menu the display parameters of the control unit are displayed and edited.

Starting point: Menu 800 (CU MAINTENANCE)

☞ Press softkey (6) **DISPLAY PARAMS...** and the following display appears:



No.	Control	Action	Notes
3	INDICA TORS	Press softkey INDICATORS. Set value.	Setting the LED brightness Indicators: 100 % Permitted range of values: 0% to 100%
4	KEY ILLUM	Press softkey KEY ILLUM. Set value.	Setting the front key illumination Key Illum: 100 % Permitted range of values: 0% to 100%
5	YYYY/MM/DD MM/DD/YYYY DD.MM.YYYY DATE	Press softkey DATE. Select format.	Selection of the date format
9	SAVE *	Press softkey SAVE.	Saves the current configuration. The asterisk (*) indicates that the new settings have not yet been stored.
11	FREQ NORMAL ICAO	Press softkey FREQ. Select setting.	Selection of the frequency mode NORMAL: Frequency: 310000000 Hz ICAO: Frequency: 310.000 MHz

<table>
<tr><th>No.</th><th>Control</th><th>Action</th><th>Notes</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Frequency (MHz)</th><th>Channel spacing (kHz)</th><th>Channel</th></tr>
<tr><td>xxx.0000</td><td>25</td><td>xxx.000</td></tr>
<tr><td>xxx.0000</td><td>8.33</td><td>xxx.005</td></tr>
<tr><td>xxx.0083</td><td>8.33</td><td>xxx.010</td></tr>
<tr><td>xxx.0167</td><td>8.33</td><td>xxx.015</td></tr>
<tr><td>xxx.0250</td><td>25</td><td>xxx.025</td></tr>
<tr><td>xxx.0250</td><td>8.33</td><td>xxx.030</td></tr>
<tr><td>xxx.0333</td><td>8.33</td><td>xxx.035</td></tr>
<tr><td>xxx.0417</td><td>8.33</td><td>xxx.040</td></tr>
<tr><td>xxx.0500</td><td>25</td><td>xxx.050</td></tr>
<tr><td>xxx.0500</td><td>8.33</td><td>xxx.055</td></tr>
</table>
</td></tr>
<tr><td>12</td><td> 
</td><td>Press softkey DISP TIMER.

Set value.</td><td>Setting of the display timer in the range of 1 to 60 minutes (display goes blank).
 

Permitted range of values: 0 to 60 min.
After this timeout the display goes blank.</td></tr>
<tr><td>13</td><td> 
</td><td>Press softkey BRIGHT.

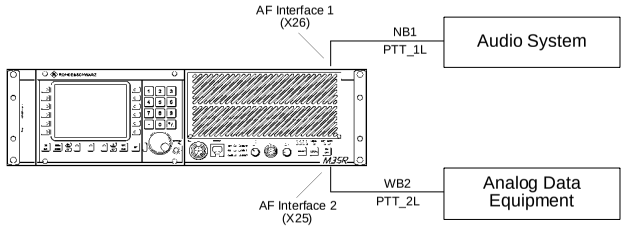
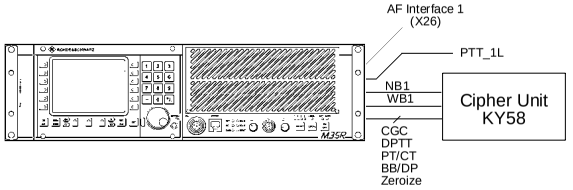
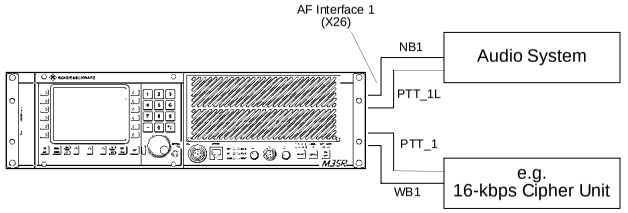
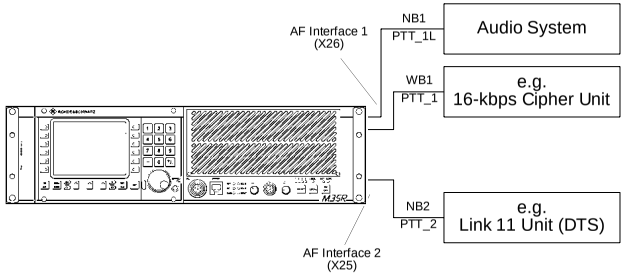
Set value.</td><td>Setting of the display brightness in percent.
 

Permitted range of values: 0% to 100%</td></tr>
<tr><td>14</td><td> 
</td><td>Press softkey CONTR.

Set value.</td><td>Setting the display contrast in percent.
 

Permitted range of values: 0% to 100%</td></tr>
</table>

Default

Device	Audio line	Keyline			Communication Mode
none	NB1 WB2	PTT_1L PTT_2L	Radio operation mode: FIX.FRQ Communication mode: V/D UNCP = x; WB ANALOG = x		❑ Voice / Data unciphered ❑ Wideband analog
CIPHER UNIT	NB1 WB1	PTT_1L	Radio operation mode: FIX.FRQ Communication mode: V/D UNCP = x; V/D CP = x		❑ Voice / Data unciphered ❑ Voice / Data ciphered
SYNC WB DATA	NB1 WB1	PTT_1L PTT_1	Radio operation mode: FIX.FRQ Communication mode: V/D UNCP = x; WB DIGITAL BB = x; WB DIGITAL DP = x		❑ Voice / Data unciphered ❑ Wideband digital baseband ❑ Wideband digital diphase
SYNC WB DATA LINK11	NB1 WB1 NB2	PTT_1L PTT_1 PTT_2	Radio operation mode: FIX.FRQ Communication mode: V/D UNCP = x; WB DIGITAL BB = x; WB DIGITAL DP = x; LINK11 = x		❑ Voice / Data unciphered ❑ Wideband digital baseband ❑ Wideband digital diphase ❑ Link11

Both keylines are enabled for both communication modes. E.g. keyline PTT_1L activates transceiver in V/D UNCP and WB ANALOG.

Fig. 3.8 Application Examples, e.g. XT 4410A

4. Malfunction

4.1 Introduction

This chapter provides information concerning

- ❑ Visual Inspection
- ❑ Troubleshooting
  - BIT Design
  - BIT Radio (Menu RADIO MAINTENANCE)
  - BIT Control Unit (Menu CU MAINTENANCE)

4.2 Visual Inspection

Check the following:

1. Check external cabling between the complete transceiver and external equipment.
2. Check all connectors for firm seating and the power supply cable and RF coaxial cables at the rear for mechanical damage. If necessary, replace cables by new ones one at a time until the defective connection has been found.

C A U T I O N

If a connector shows any discolouration caused by heat, its mating connector is also defective and must be replaced, too.

Obvious damage of minor importance can be eliminated on the spot, provided that the appropriate equipment is available. In case of severe damage, the transceiver must be sent to the nearest repair facility.

4.3 Troubleshooting

Troubleshooting of the remote-controlled transceiver is possible by using for instance a Control Unit GB 4000C, mod. 03.

4.3.1 BIT Design

For detection of device and system failures Built-In Test (BIT) functions are implemented in the equipment.

The BIT functions support the service team in detecting and analysing equipment and system errors, helping them to decide on appropriate countermeasures.

❑ PBIT

- The Power-on BIT is performed automatically after power supply has been switched on.

❑ CBIT

- The Continuous BIT starts directly after PBIT.
- The system is subjected to a functional check.
- The modules installed in the radio basis are continuously checked by CBIT.
- Warnings and/or error messages produced during ongoing operation are displayed in Menu 410 (RADIO CBIT RESULTS) for the transceiver and in Menu 810 (CU CBIT RESULTS) for the control unit.
- As long as an error is indicated in Menu 410 (RADIO CBIT RESULTS), the GO LED remains dark and connector contact X23.4 (NOGO) carries low level.
- Menu 420 (RADIO ERROR LIST) or 820 (CU ERROR LIST) displays all warnings and error messages that have occurred, together with the time of occurrence.
- When malfunctions (warning or error message) have been detected, the failure is signalled to the control unit and/or via GB2PP protocol to a connected remote control unit.

❑ IBIT

- The Initiated BIT is used for equipment diagnostics (test of LEDs, RF wiring etc.). IBIT helps to localize failures and to support maintenance.
- It can be activated directly on the local control unit (Menu 405 (RADIO IBIT RESULTS)) and also by a remote control command (only GB2PP protocol).
- It takes several minutes for IBIT to be completed. It is possible to interrupt this test any time and to continue later.
- During IBIT the transceiver is not available for operation.
- Please note that the radio is only ok if CBIT and IBIT both signal GO.

The rating of a BIT message can be either warning or error, depending on how serious the trouble is.

❑ When there is a warning, operation may still go on, although the radio should be checked as soon as possible. The GO LED remains lighted in the presence of warnings.

❑ When an error is indicated, the radio is not working correctly and needs to be sent to the next repair facility. The GO LED is extinguished in the presence of errors, and contact X23.4 changes to low level.

Irrespective of the rating, a BIT message is reported in Menu 410 (RADIO CBIT RESULTS) and/or Menu 420 (RADIO ERROR LIST). Please take care: the RADIO ERROR LIST contains both errors and warnings.

CBIT always indicates the existing state, that means, as long as a BIT message is being indicated by CBIT, this problem persists.

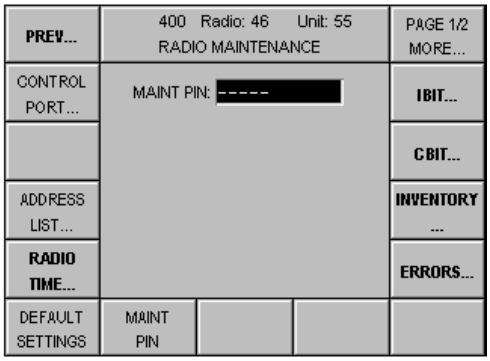
4.3.2 BIT Radio

4.3.2.1 Menu 400, Page 1: RADIO MAINTENANCE

Via this menu the maintenance functions implemented in the radio are activated.

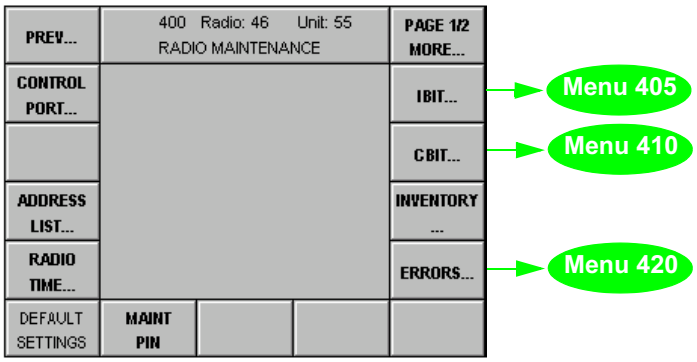
Starting point: Menu 040 (MAIN)

☞ Press softkey (4) **RADIO MAINT...** and the following display appears:



☞ Enter maintenance PIN (5 digits) by using the numerical keypad, then press ENTER.

❑ The following display appears:



Note:

Softkeys INVENTORY..., MAINT PIN, DEFAULT SETTINGS, RADIO TIME..., ADDRESS LIST... and CONTROL PORT are described in chapter 3.

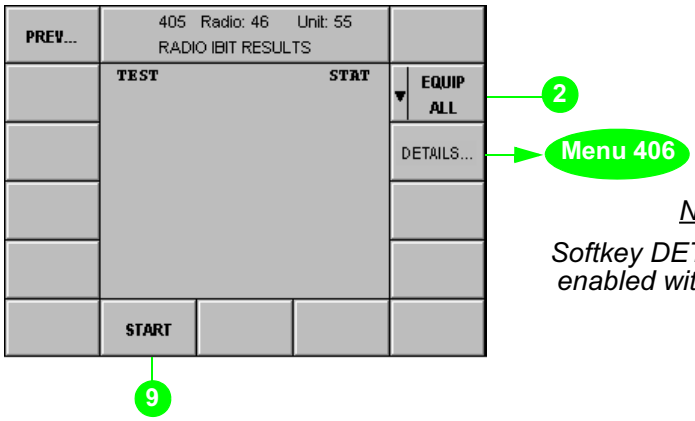
☞ Press the relevant softkey to call up any of these menus.

4.3.2.2 Menu 405: RADIO IBIT RESULTS

In this menu, an IBIT (Initiated Built-In Test) for the entire radio or a selected Comline can be started. After completion of IBIT the results are displayed.

Starting point: Menu 400, page 1 (RADIO MAINTENANCE)

☞ Press softkey (2) [IBIT...] and the following display appears:



Note:

Softkey DETAILS... is only enabled with status ERR.

No.	Control	Action	Notes
2	ALL / CL1 — EQUIP ALL	Press softkey EQUIP. Select equipment.	Selection of equipment for IBIT **ALL:** all components installed **CL1:** components of Comline CL1 *Note:* *Error messages resulting from IBIT are displayed selectively, depending on the selected equipment.*
9	START STOP	Press softkey START. Terminate IBIT with softkey STOP.	Starts IBIT for the selected configuration. *Note:* *IBIT can be stopped any time.*

Note:

Perform IBIT only under the following conditions:

- *Radio operation mode: FIX.FRQ*
- *Modulation mode: AM*
- *Communication mode: V/D UNCP (voice/data unciphered)*
- *Make sure that the full 28-VDC supply voltage is available at all times, otherwise the required transmit power will fail to be obtained and a relating BIT warning will be produced.*

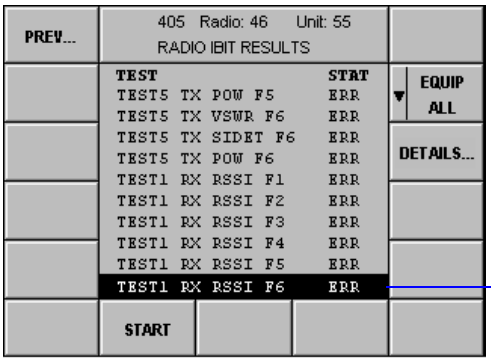
If these requirements are not met, an error message may come up when the IBIT is started. Once the IBIT is completed, reset the radio (key ON/OFF). Please note that during IBIT low-power transmit signals are radiated.

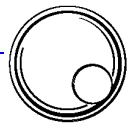
As soon as IBIT signals anything other than GO, IBIT needs to be repeated. If the same error persists, send the radio to the depot for repair.

4.3.2.3 Menu 406: RADIO IBIT DETAILS

This menu displays information about an IBIT result.

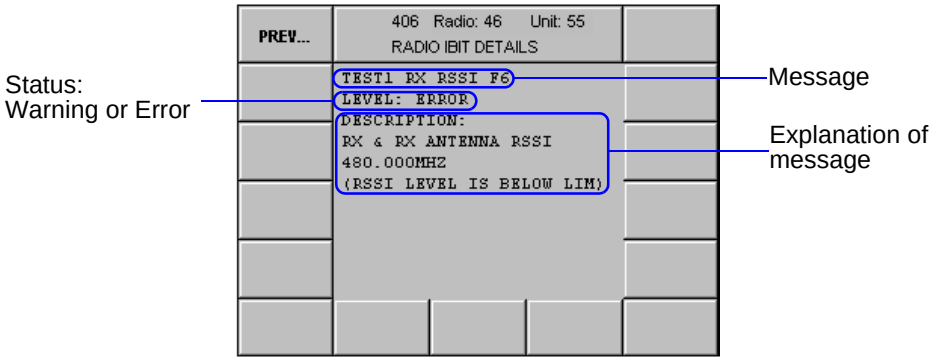
Starting point: Menu 405 (RADIO IBIT RESULTS)





☞ Select message.

☞ Press softkey (3) **DETAILS...** and the following display appears:



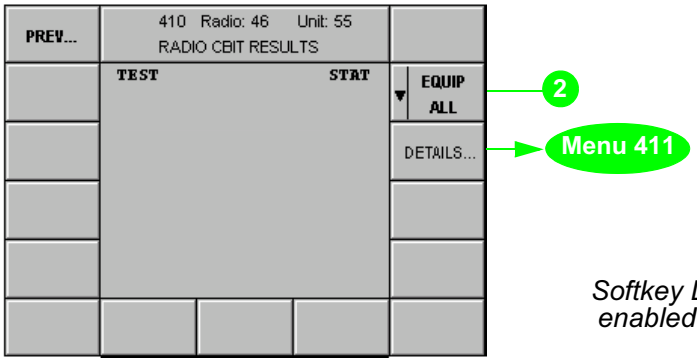
➢ See also Menu 420 (RADIO ERROR LIST) and Menu 421 (RADIO ERROR DETAILS).

4.3.2.4 Menu 410: RADIO CBIT RESULTS

This menu provides information about the CBIT (Continuous Built-In Test) results. It displays all currently existing warnings and/or errors. As long as an error persists, the GO LED is extinguished and contact X23.4 (NOGO) carries low level.

Starting point: Menu 400, page 1 (RADIO MAINTENANCE)

☞ Press softkey (3) [CBIT...] and the following display appears:



Note:

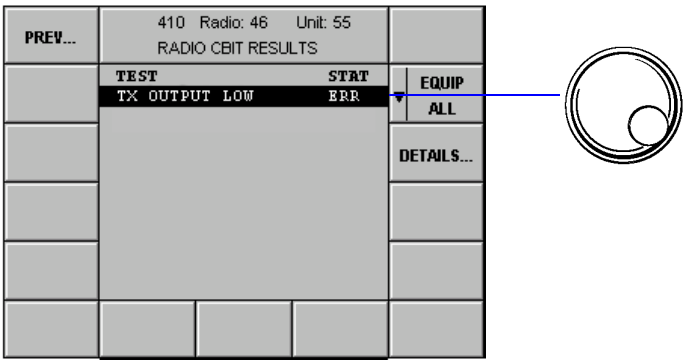
Softkey DETAILS... is only enabled with status ERR.

No.	Control	Action	Notes
2	ALL / CL1 ▼ EQUIP ALL	Press softkey EQUIP. Select equipment.	Selection of equipment for CBIT **ALL:** all components installed **CL1:** components of Comline CL1

4.3.2.5 Menu 411: RADIO CBIT DETAILS

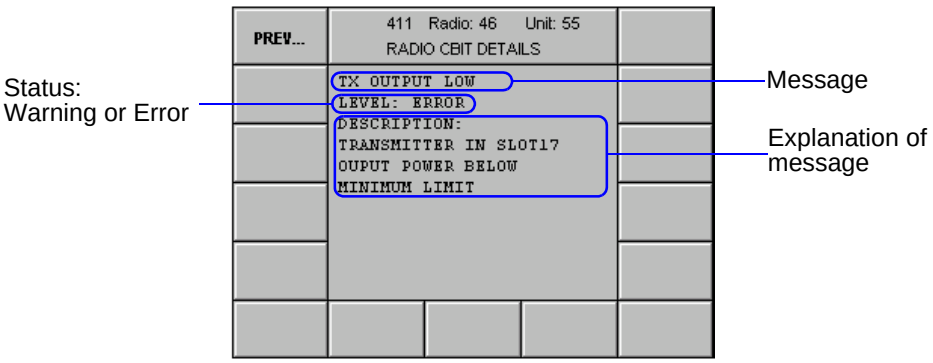
This menu displays information about a CBIT result.

Starting point: Menu 410 (RADIO CBIT RESULTS)



☞ Select message.

☞ Press softkey (3) DETAILS... and the following display appears:



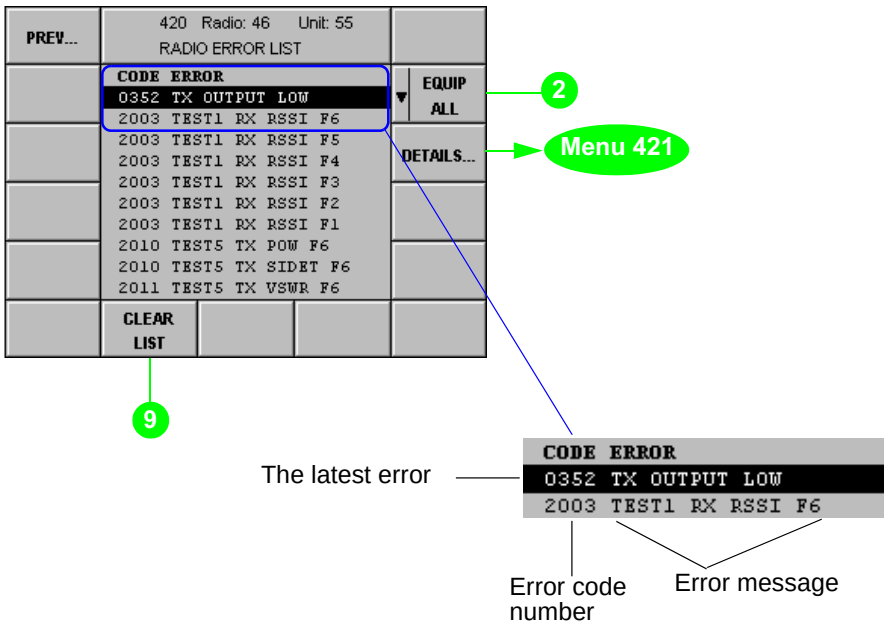
➢ See also Menu 420 (RADIO ERROR LIST) and Menu 421 (RADIO ERROR DETAILS).

4.3.2.6 Menu 420: RADIO ERROR LIST

This menu selectively displays all messages (warnings and errors) which have occurred in the radio, depending on the selected equipment. The first list entry always refers to the most recent error. Up to 100 errors may be listed. When the error list is full, a warning message comes up prompting the operator to clear the error list. Failure to do so will close the error list for new entries.

Starting point: Menu 400, page 1 (RADIO MAINTENANCE)

☞ Press softkey (5) [ERRORS...] and the following display appears:

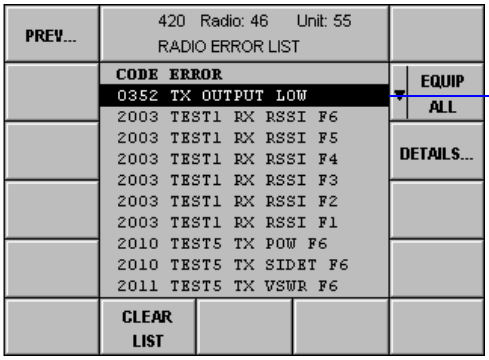


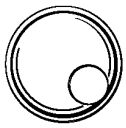
No.	Control	Action	Notes
2	ALL / CL1 ▼ EQUIP ALL	Press softkey EQUIP. Select equipment.	Selection of equipment for error list **ALL:** all components installed **CL1:** components of Comline CL1 Depending on the selection, all errors or only those concerning CL1 are listed.
9	CLEAR LIST	Press softkey CLEAR LIST.	Clears the complete error list in Menu 420.

4.3.2.7 Menu 421: RADIO ERROR DETAILS

This menu shows the details of an error.

Starting point: Menu 420 (RADIO ERROR LIST)





☞ Select error message.

☞ Press softkey (3) **DETAILS...** and the following display appears:

The details of an error selected in Menu 420 comprise the following data:

- Name of error
- Error index — Consecutive error number in the radio error list
- Error Code — See Error Code List in chapter 4.3.2.8
- Comline — Comline No.
- Time — Time and date of error occurrence
- Level — Classification of failure: error or warning
- Repeat Counter — Number of occurrences
- Description — Description of failure

4.3.2.8 Error List

Check the error code and proceed as indicated in the Action column (in most cases the radio will need to be transferred to the nearest depot facility).

Note:

Error codes 2xxx are not listed in the table. If IBIT (see chapter 4.3.2.2) returns a 2xxx error code, IBIT must be repeated. If the error persists, send the radio to the depot.

Code	Message	Level	Notes	Action (CBIT message, frequent or single event)
0001	GR CNAPI ERR	W		Inform depot.
0002	GR General Software Error	W		Inform depot.
0003	GR ERR STR FULL	W	Error store full	Inform depot.
0004	GR FLASH CHCKS ERR	E	Checksum error of Flash EEPROM	Inform depot.
0100	PL +2.5 V LOW	E	Platform error: +25-V reference voltage low	Send radio to depot.
0101	PL V_BATT LOW	W	Platform warning: 33-V battery low	Send radio to depot (replace the platform battery).
0102	PL V_RET LOW	E	Platform error: Retention voltage low	Send radio to depot.
0103	PL INT +10V LOW	E	Platform error: Internal voltage +10 V low	Send radio to depot.
0105	PL INT -10V LOW	E	Platform error: Internal voltage -10 V low	Send radio to depot.
0106	PL OVERTEMP	W	Platform warning: Overtemperature	Check airflow of fans and ambient temperature. If this fails to eliminate the fault, send radio to depot.
0150	PL SRAM BATT EMPTY	W	Platform warning: SRAM battery is low	Send radio to depot (replace the platform SRAM battery).
0200	PS -12V LOW	E	DC power supply error: Voltage -12 V low	CBIT message or frequent event: Send radio to depot. Single event: no action
0201	PS +3.3V LOW	E	DC power supply error: Voltage +33 V low	CBIT message or frequent event: Send radio to depot. Single event: no action
0202	PS +5V LOW	E	DC power supply error: Voltage +5 V low	CBIT message or frequent event: Send radio to depot. Single event: no action
0203	PS +12V LOW	E	DC power supply error: Voltage +12 V low	CBIT message or frequent event: Send radio to depot. Single event: no action
0204	PS +33V LOW	E	DC power supply error: Voltage +33 V low	CBIT message or frequent event: Send radio to depot. Single event: no action

Code	Message	Level	Notes	Action (CBIT message, frequent or single event)
0205	PS MAIN VLT LOW	W	DC power supply warning: Main voltage (28 VDC) low	CBIT message: Send radio to depot. Frequent event: Check configuration (Menu 511, function PWR SUP). Switch off and check external power supply, cables and connectors at X31. If this fails to eliminate the fault, send the radio to depot. Single event: Check configuration (Menu 511, function PWR SUP). Switch off and check external power supply, cables and connectors at X31.
0206	PS BATT VLT LOW	W	DC power supply warning: Battery voltage low	CBIT message: Send radio to depot. Frequent event: Check configuration (Menu 511, function PWR SUP). Switch off and check external power supply, cables and connectors at X31. If this fails to eliminate the fault, send the radio to depot. Single event: Check configuration (Menu 511, function PWR SUP). Switch off and check external power supply, cables and connectors at X31.
0207	PS VLT LW VLIM	W	DC power supply warning: VLIM voltage low	CBIT message or frequent event: Send radio to depot. Single event: no action
0208	PS VLT EXT SW	W	DC power supply warning: Voltage for external switch low	CBIT message or frequent event: Send radio to depot. Single event: no action
0209	PS 28V LT AMP LOW DC	W	DC power supply warning: 28 VDC for left amplifier low	CBIT message or frequent event: Send radio to depot. Single event: no action
0210	PS 28V RT AMP LOW DC	W	DC power supply warning: 28 VDC for right amplifier low	CBIT message or frequent event: Send radio to depot. Single event: no action
0211	PS 28V DRV AMP LOW	W	DC power supply warning: 28 VDC for driver amplifier low	CBIT message or frequent event: Send radio to depot. Single event: no action
0212	PS VLT PAX LW VLIM	W	DC power supply warning Voltage power amplifier below limit	CBIT message or frequent event: Send radio to depot. Single event: no action
0213	PS OVERTEMP	W	DC power supply warning: Overtemperature in power supply unit	CBIT message or frequent event: Check airflow of fans and ambient temperature. If this fails to eliminate the fault, send radio to depot. Single event: Check airflow of fans and ambient temperature.

Code	Message	Level	Notes	Action (CBIT message, frequent or single event)
0214	PS SPEED FAN1 LOW	W	DC power supply warning: Speed of fan 1 at transceiver rear is too low	CBIT message or frequent event: Check airflow of fans and ambient temperature. If this fails to eliminate the fault, send radio to depot. Single event: Check airflow of fans and ambient temperature.
0215	PS SPEED FAN2 LOW	W	DC Power supply warning: Speed of fan 2 at transceiver rear is too low	CBIT message or frequent event: Check airflow of fans and ambient temperature. If this fails to eliminate the fault, send radio to depot. Single event: Check airflow of fans and ambient temperature.
0216	PS DC UNDER VOLT	W	DC power supply warning: External DC supply under 18 VDC	CBIT message or frequent event: Switch off and check external AC/DC Power Supply IN 4000A, cables and connectors. If this fails to eliminate the fault, send radio to depot. Single event: Switch off and check external AC/DC Power Supply IN 4000A, cables and connectors.
0217	PS NO SYNC	E	DC power supply error: External 100-kHz reference not present	CBIT message or frequent event: Send radio to depot. Single event: no action
0218	PS OVERTEMP AC/DC	W	DC power supply warning: Overtemperature in external Power Supply IN 4000A	CBIT message or frequent event: Switch off and check external AC/DC Power Supply IN 4000A, cables and connectors. If this fails to eliminate the fault, send radio to depot. Single event: Switch off and check external AC/DC Power Supply IN 4000A, cables and connectors.
0250	SY DEF	E	Synthesizer error: Module defective	CBIT message or frequent event: Send radio to depot. Single event: no action
0251	SY VOLT ERR	E	Synthesizer error: Voltage error	CBIT message or frequent event: Send radio to depot. Single event: no action
0252	SY SYNC	E	Synthesizer error: Synchronization error / bad time reference	CBIT message or frequent event: Send radio to depot. Single event: no action
0253	SY EXT FREQ REF	E	Synthesizer error: Not locked to an external reference	CBIT message or frequent event: Send radio to depot. Single event: no action
0254	SY LEV LO OSC	E	Synthesizer error: Local oscillator level low	CBIT message or frequent event: Send radio to depot. Single event: no action
0255	SY SYNC ERR	E	Synthesizer error: Synchronization/timing error	CBIT message or frequent event: Send radio to depot. Single event: no action

Code	Message	Level	Notes	Action (CBIT message, frequent or single event)
0256	SY PLL UNLOCK	E	Synthesizer error: PLL unlock	CBIT message or frequent event: Send radio to depot. Single event: no action
0257	SY FREQ CMD ERR	W	Synthesizer warning: Incorrect frequency value commanded	Inform depot.
270	HSELU FREQ CMD ERR	W	UHF filter warning: Illegal frequency value commanded	Inform depot.
271	HSELU NO OUTPOW	E	UHF filter error: No output power. The error message disappears after the next faultless transmission.	CBIT message or frequent event: Send radio to depot. Single event: no action
272	HSELU NO INPOW	E	UHF filter error: No input power. The error message disappears after the next faultless transmission.	CBIT message or frequent event: Send radio to depot. Single event: no action
273	HSELU VOLT ERR	E	UHF filter error: Voltage error	CBIT message or frequent event: Send radio to depot. Single event: no action
274	HSELU DEFECT	E	UHF filter error: UHF filter defective	CBIT message or frequent event: Send radio to depot. Single event: no action
0300	RX OVERTEMP	W	Receiver warning: Overtemperature in module	CBIT message or frequent event: Check airflow of fans and ambient temperature. If this fails to eliminate the fault, send radio to depot. Single event: Check airflow of fans and ambient temperature.
0301	RX EXT REF NOT PRES	E	Receiver error: External 100-kHz reference frequency not present	CBIT message or frequent event: Send radio to depot. Single event: no action
0302	RX IF PART OVERLOAD	E	Receiver error: IF part overload	CBIT message or frequent event: Send radio to depot. Single event: no action
0303	RX IN SIG OVERLOAD	W	Receiver warning: Input signal overload	CBIT message or frequent event: Receive signal too large. Switch off and check RF cables. If this fails to eliminate the fault, send radio to depot. Single event: Receive signal too large. Switch off and check RF cables.
0304	RX GEN ERR	E	Receiver error: General error	CBIT message or frequent event: Send radio to depot. Single event: no action
0305	RX WATCHDOG	E	Receiver error: Reset of µP caused by watchdog circuit	Send radio to depot.

Code	Message	Level	Notes	Action (CBIT message, frequent or single event)
0306	RX INT REF DEF	E	Receiver error: Internal reference defective	Send radio to depot.
0307	RX IF PART DEF	E	Receiver error: IF part defective	Send radio to depot.
0308	RX INT LO DEF	E	Receiver error: Internal local oscillator defective	CBIT message or frequent event: Send radio to depot. Single event: no action
0309	RX EXT LO NOT PRES	E	Receiver error: External local oscillator not present	CBIT message: Send radio to depot. frequent event: Switch off and check RF cables. If this fails to eliminate the fault, send radio to depot. Single event: no action
0350	TX GLOBAL ERROR	E	Transmitter error: TX is switched off due to global error in module	Send radio to depot.
0351	TX PIN DIODE SW DEF	E	Transmitter error: PIN diode switch defective	Send radio to depot.
0352	TX OUTPUT LOW	E	Transmitter error: Output power below minimum limit	CBIT message or frequent event: Send radio to depot. Single event: no action
0353	TX OUTPUT HIGH	E	Transmitter error: Output power above maximum limit	CBIT message or frequent event: Send radio to depot. Single event: no action
0354	TX OVERTEMP	W	Transmitter warning: Tx is switched off due to overtemperature in module	CBIT message or frequent event: Check airflow of fans and ambient temperature. If this fails to eliminate the fault, send radio to depot. Single event: Check airflow of fans and ambient temperature.
0355	TX WATCHDOG	E	Transmitter error: Reset of µP caused by watchdog circuit	Send radio to depot.
0356	TX INCORR CMD	E	Transmitter error: Received command is not correct	Send radio to depot.
0357	TX OVERVOLTAGE	W	Transmitter warning: Overvoltage	CBIT message or frequent event: Switch off and check DC power supply. If this fails to eliminate the fault, send radio to depot. Single event: Switch off and check DC power supply.
0358	TX EXT REF NOT PRES	E	Transmitter error: External 100-kHz reference is not present	CBIT message or frequent event: Send radio to depot. Single event: no action
0359	TX VSWR	W	Transmitter warning: Voltage standing-wave ratio above limit	Switch off and check antenna cabling. If this fails to eliminate the fault, send radio to depot.

Code	Message	Level	Notes	Action (CBIT message, frequent or single event)
0360	TX IN DRIVE MISSING	E	Transmitter error: Input drive signal below limit or missing	CBIT message or frequent event: Send radio to depot. Single event: no action
0361	TX POW CTL LOOP LIM	E	Transmitter error: Power control loop out of limits	CBIT message or frequent event: Send radio to depot. Single event: no action
0362	TX POW REDUCED	W	Transmitter warning: Output power reduced	Check airflow of fans, ambient temperature, antenna cabling and DC power supply. If this fails to eliminate the fault, send radio to depot.
0363	TX TEMP SENS SH	E	Transmitter error: Temperature sensor is shorted / defective	Inform depot.
0400	GRX WATCHDOG	E	Guard receiver error: Reset of µP caused by watchdog circuit	Send radio to depot.
0401	GRX EXT REF NOT PRE	E	Guard receiver error: External 100-kHz reference is not present	CBIT message or frequent event: Send radio to depot. Single event: no action
0402	GRX VCO1 NOT LOCKED	E	Guard receiver error: Loop of VCO1 (Voltage-Controlled Oscillator) not locked	CBIT message or frequent event: Send radio to depot. Single event: no action
0403	GRX VCO2 NOT LOCKED	E	Guard receiver error: Loop of VCO2 (Voltage-Controlled Oscillator) not locked	CBIT message or frequent event: Send radio to depot. Single event: no action
0404	GRX IN SIG OVERLOAD	W	Guard receiver warning: Input signal overload	CBIT message or frequent event: Receive signal too large. Switch off and check RF cables. If this fails to eliminate the fault, send radio to depot. Single event: Receive signal too large. Switch off and check RF cables.
0500	AFI WATCHDOG	E	Audio frequency interface error: Reset of µP caused by watchdog circuit	Send radio to depot.
0501	AFI BUFFER OVERFLOW	W	Audio frequency interface warning: Sample buffer overflow	Inform depot.
0502	AFI CMD ERR	E	Audio frequency interface error: Received command is not correct	Inform depot.
0503	AFI CODEC	E	Audio frequency interface error: Error in CODEC	CBIT message or frequent event: Send radio to depot. Single event: no action
0504	AFI R/W ERR	E	Audio frequency interface error: Error during read/write access	Inform depot.

Code	Message	Level	Notes	Action (CBIT message, frequent or single event)
0550	FPGA1 R/W ERR	E	Platform error: Test of internal circuit failed	Send radio to depot.
0551	FPGA2 R/W ERR	E	Platform error: Test of internal circuit failed	Send radio to depot.
0552	FPGA3 R/W ERR	E	Platform error: Test of internal circuit failed	Send radio to depot.
0600	IF CBIT OF EXT AMP	W	Pin TEST1 X278 / X288 CBIT warning of external amplifier	CBIT message or frequent event: Switch off and check external amplifier / filter, cables and connectors. If this fails to eliminate the fault, send radio to depot. Single event: Switch off and check external amplifier / filter, cables and connectors.
0601	IF CBIT OF EXT AMP	W	Pin TEST0 X2735 / X2835 CBIT warning of external amplifier	CBIT message or frequent event: Switch off and check external amplifier / filter, cables and connectors. If this fails to eliminate the fault, send radio to depot. Single event: Switch off and check external amplifier / filter, cables and connectors.
0602	IF VSWR OF EXT AMP	W	Pin VSWR X2720 / 37 / X2820 / 37 VSWR warning of external amplifier	CBIT message or frequent event: Switch off and check antenna cabling. If this fails to eliminate the fault, send radio to depot. Single event: Switch off and check antenna cabling.
0603	EXT PA TUNING X27	W	Pin TX_INHIBIT 0 X274 Tuning error of external filter (testing period 20 s before output of warning)	Switch off and check external filter, cables and connectors. If this fails to eliminate the fault, send radio to depot.
0604	EXT PA TUNING X27	W	Pin TX_INHIBIT 1 X2722 Tuning error of external filter (testing period 20 s before output of warning)	Switch off and check external filter, cables and connectors. If this fails to eliminate the fault, send radio to depot.
0605	EXT PA TUNING X28	W	Pin TX_INHIBIT 2 X284 Tuning error of external filter (testing period 20 s before output of warning)	Switch off and check external filter, cables and connectors. If this fails to eliminate the fault, send radio to depot.
0606	EXT PA TUNING X28	W	Pin TX_INHIBIT 3 X2822 Tuning error of external filter (testing period 20 s before output of warning)	Switch off and check external filter, cables and connectors. If this fails to eliminate the fault, send radio to depot.
0700	PL PLL1 UNLOCK	W	Platform warning: PLL1 is unlocked	CBIT message or frequent event: Send radio to depot. Single event: no action
0701	PL PLL1 NO REF FREQ	W	Platform warning: No reference frequency for PLL1	Check configuration (Menu 511, function EXT REF). Check the cabling at interface X10. If required, change the configuration or replace the cable if external reference is ok.
0702	PL OCXO TEMP	W	Platform warning: Temperature of OCXO low	Warning occurs either when changing from TCXO to OCXO or while oven-controlled oscillator is in warm-up phase.

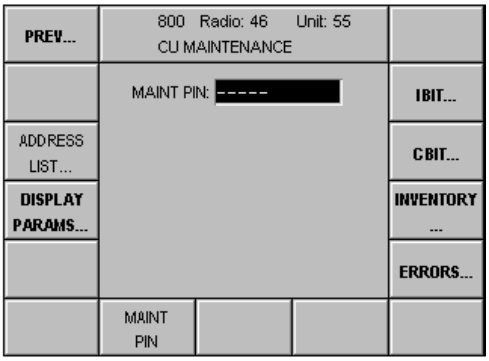
Code	Message	Level	Notes	Action (CBIT message, frequent or single event)
0703	PL PLL2 UNLOCK	E	Platform error: PLL2 is unlocked	CBIT message or frequent event: Send radio to depot. Single event: no action
0704	PL PLL2 NO REF FREQ	E	Platform error: No reference frequency for PLL2	Check configuration (Menu 511, function EXT REF). Check the cabling at interface X10. If required, change the configuration or replace the cable if external reference is ok.

4.3.3 BIT Control Unit

4.3.3.1 Menu 800: CU MAINTENANCE

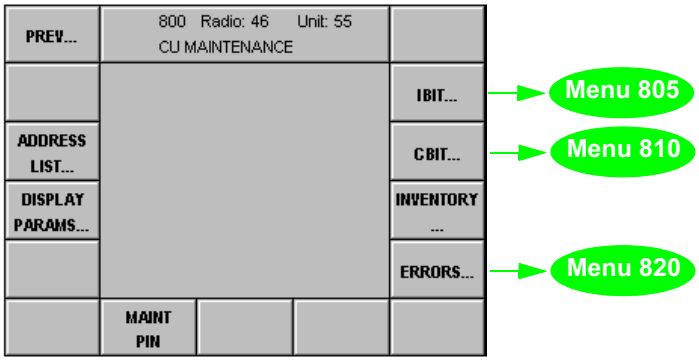
Starting point: Menu 040 (MAIN)

☞ Press softkey (6) **CU... MAINT** and the following display appears:



☞ Enter control unit maintenance PIN number (5 digits) by using the numerical keypad, then press ENTER.

❑ The following display appears:



Note:

Softkeys INVENTORY..., MAINT PIN, DISPLAY PARAMS... and ADDRESS LIST... are described in chapter 3.

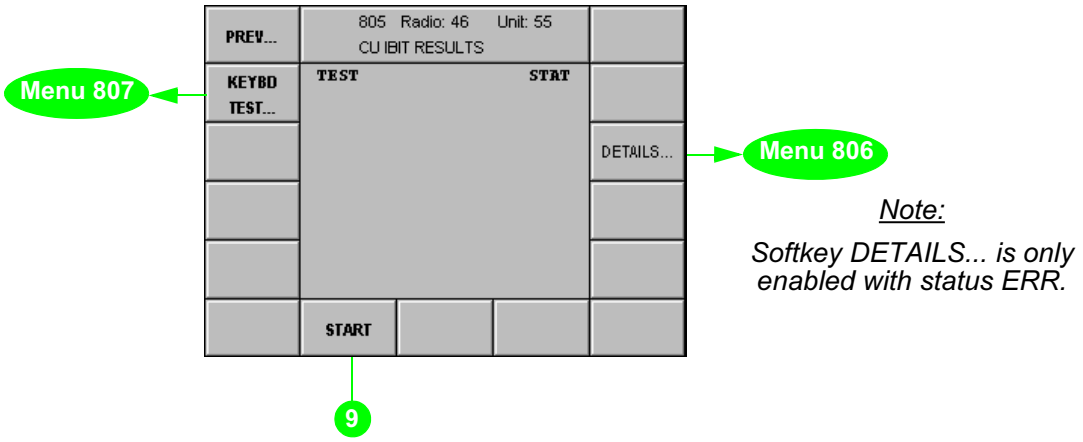
☞ Press the relevant softkey to call up any of these menus.

4.3.3.2 Menu 805: CU IBIT RESULTS

In this menu the operator can start an IBIT (Initiated Built-In Test) for the Control Unit. When IBIT is completed the results are displayed.

Starting point: Menu 800 (CU MAINTENANCE)

☞ Press softkey (2) [IBIT...] and the following display appears:



Note:

Softkey DETAILS... is only enabled with status ERR.

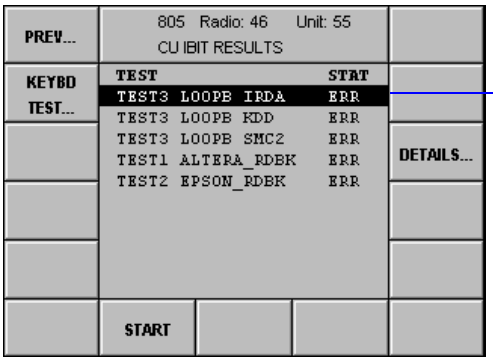
No.	Control	Action	Notes
9	[START]	Press softkey START.	Starts IBIT. *Note:* *IBIT can be stopped any time.*
	[STOP]	Terminate IBIT with softkey STOP.	
			The keyboard test starts automatically. `Leave IBIT in 10 sec or press <ESCCLR + ENT>`
	[ESC CLR] + [ENT]	Press keys ESC/ CLR plus ENT at the same time.	
	[KEYBD TEST...]	Terminate key-board test with softkey KEYBD TEST.	

As soon as IBIT signals anything other than GO, IBIT needs to be repeated. If the error persists, send the radio to the depot for repair.

4.3.3.3 Menu 806: CU IBIT DETAILS

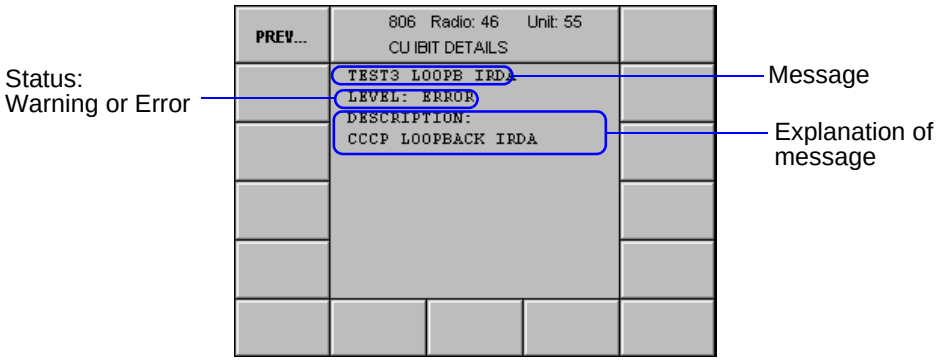
This menu displays information about an IBIT result.

Starting point: Menu 805 (CU IBIT RESULTS)



☞ Select message.

☞ Press softkey (3) **DETAILS...** and the following display appears:



➢ See also Menu 820 (CU ERROR LIST) and Menu 821 (CU ERROR DETAILS).

4.3.3.4 Menu 807: CU KEYBOARD TEST

In the Keyboard Test the keyboard is checked for proper functioning. For this test the operator should press all keys and softkeys one after the other. The display shows which key has just been pressed. The keyboard test can be stopped any time by pressing keys ESC/CLR and ENT simultaneously.

When triggering the IBIT in Menu 805 the keyboard test is started automatically.

Starting point: Menu 805 (CU IBIT RESULTS)

☞ Press softkey (14) [KEYBD TEST...] and the following display appears:

After ten seconds the display returns to Menu 805.

or:

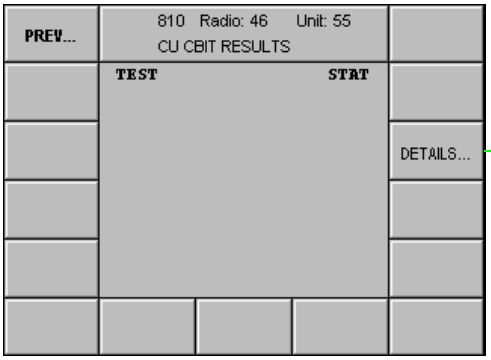
☞ Press keys ESC/CLR plus ENT at the same time.

4.3.3.5 Menu 810: CU CBIT RESULTS

In this menu the results for the Control Unit CBIT (Continuous Built-In Test) are displayed.

Starting point: Menu 800 (CU MAINTENANCE)

☞ Press softkey (3) [CBIT...] and the following display appears:



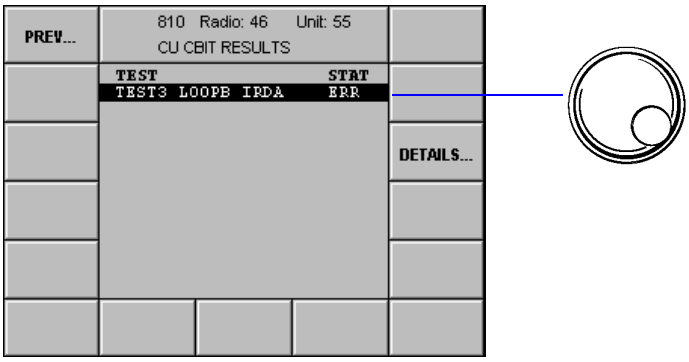
Note:

Softkey DETAILS... is only enabled with status ERR.

4.3.3.6 Menu 811: CU CBIT DETAILS

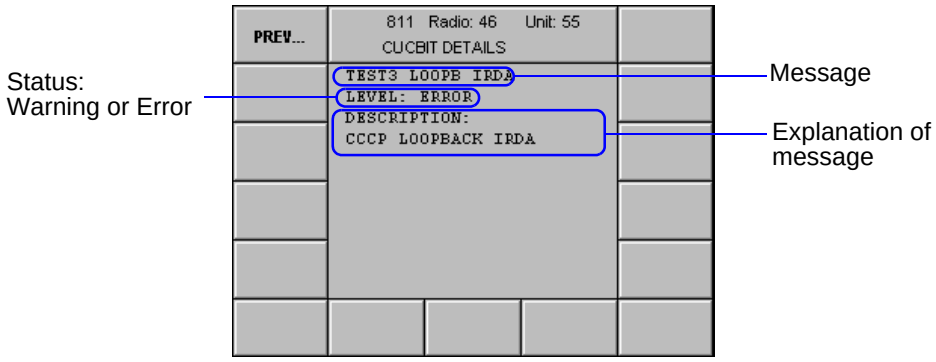
This menu displays information about a CBIT result.

Starting point: Menu 810 (CU CBIT RESULTS)



☞ Select message.

☞ Press softkey (3) DETAILS... and the following display appears:



➢ See also Menu 820 (CU ERROR LIST) and Menu 821 (CU ERROR DETAILS).

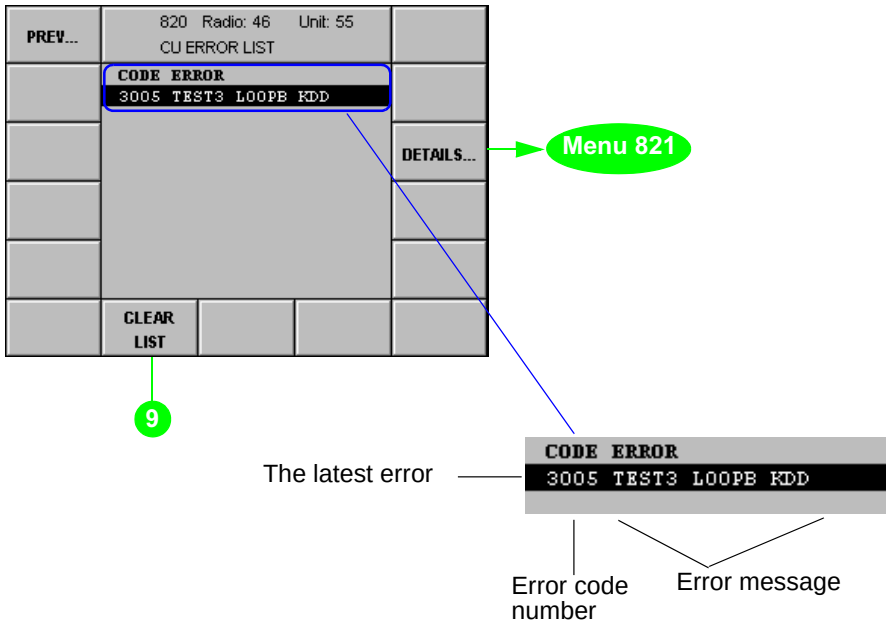
4.3.3.7 Menu 820: CU ERROR LIST

This menu displays all errors which have occurred in the control unit. The first list entry always refers to the most recent error. Up to 100 errors may be listed. When the error list is full, a warning message comes up prompting the operator to clear the error list. Failure to do so will close the error list for new entries.

Starting point: Menu 800 (CU MAINTENANCE)

☞ Press softkey (5) [ERRORS...]

❑ The following display appears:

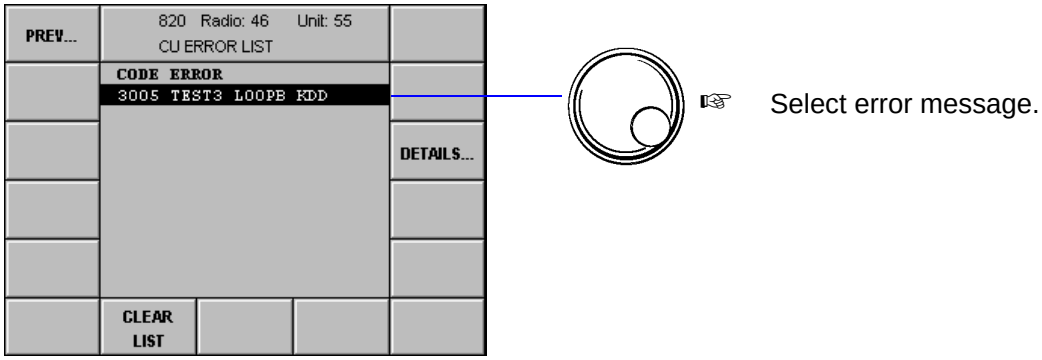


No.	Control	Action	Notes
9	CLEAR LIST	Press softkey CLEAR LIST.	Clears the complete error list in Menu 820.

4.3.3.8 Menu 821: CU ERROR DETAILS

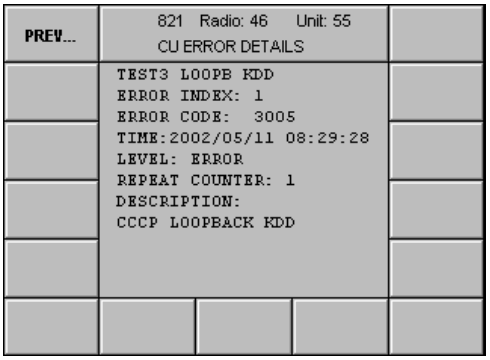
This menu shows the details of an error.

Starting point: Menu 820 (CU ERROR LIST)



☞ Select error message.

☞ Press softkey (3) **DETAILS...** and the following display appears:



The details of an error selected in Menu 820 comprise the following data:

- Name of error
- Error index — Consecutive error number in the CU error list
- Error Code — Error Code List
- Time — Time and date of error occurrence
- Level — Classification of failure: error or warning
- Repeat Counter — Number of occurrences
- Description — Description of failure

4.3.3.9 Error List

Check the error code and proceed as indicated in the Action column (in most cases the radio will need to be transferred to the nearest depot facility).

Code	Message	Level	Notes	Action (CBIT message, frequent or single event)
0002	GR General Software Error	W		Inform depot.
0003	GR ERR STR FULL	W	Error store full	Inform depot.
1000	CP +28V RANGE	W	Control panel +28 VDC out of range	Send radio to depot.
1001	CP +2.5V RANGE	W	Control panel +2.5 VDC out of range	Send radio to depot.
1002	CP +3.3V RANGE	W	Control panel +3.3 VDC out of range	CBIT message or frequent event: Send radio to depot. Single event: no action
1003	CP +5.0V RANGE	W	Control panel +5.0 VDC out of range	CBIT message or frequent event: Send radio to depot. Single event: no action
1004	CP +12V RANGE	W	Control panel +12 VDC out of range	CBIT message or frequent event: Send radio to depot. Single event: no action
1005	CP -12V RANGE	W	Control panel -12 VDC out of range	CBIT message or frequent event: Send radio to depot. Single event: no action
1006	CP OVERTEMP	W	Control panel overtemperature	Check / correct ambient temperature (must be below 55 °C). If this fails to eliminate the fault, send the radio to the depot.
1007 *)	CP SRAM BATT LOW	W	Control panel interfaces SRAM battery low	Send radio to depot.
3000	TEST1 ALTERA_RDBK	E	Read back test of FPGA failed	Send radio to depot.
3001	TEST1 EPSON_RDBK	E	Read back test of the display controller failed	Send radio to depot.
3002	TEST3 LOOPB IRDA	E	Loopback test of the IRDA interface failed	Send radio to depot.
3005	TEST3 LOOPB KDD	E	Loopback test of the KDD serial port failed	Send radio to depot.
3006	TEST3 LOOPB SMC2	E	Loopback test of the serial port SMC2 failed	Send radio to depot.

*) The SRAM battery is not a replaceable battery but a gold capacitor.

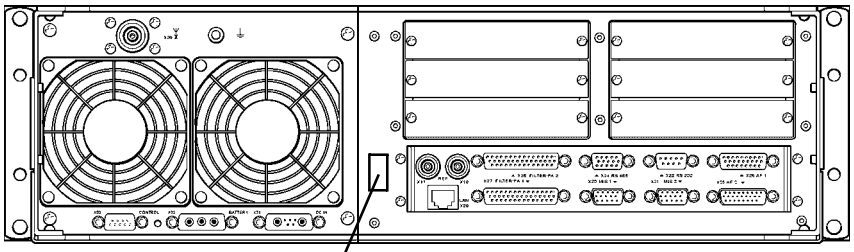
5. Maintenance

Note:

All maintenance is to be carried out by qualified personal only.

5.1 Scheduled Maintenance

- ❑ We recommend to readjust the oscillators (TCXO and OCXO, part of Radio Platform HPLAT, see the relevant Service Manual) one year after the M3SR Transceiver was first put into operation. Only this can guarantee that the specification is met.
- ❑ The backup battery (part of Radio Platform HPLAT, see the relevant Service Manual) need to be replaced once every three years after installation (see figure below).

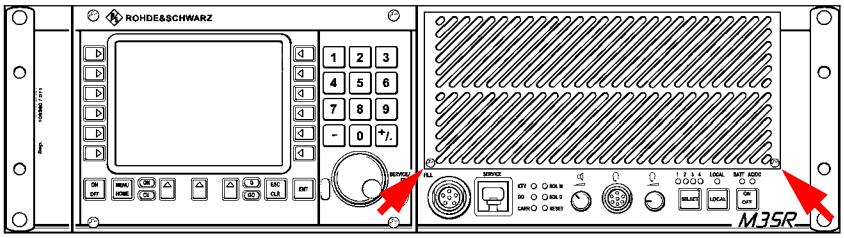


Label: Date of battery installation

- ❑ The filter mat of the dust protection filter needs to be cleaned or replaced (ident. no. 6102.6092.00) at certain intervals. The time interval depends on the environmental conditions the transceiver is operated in. To remove the filter mat proceed as follows:

  1. Undo the two screws (see figure below) fixing the cover to the front panel.

e.g. XT 4410A



  2. Carefully remove the cover.
  3. Remove the filter mat from the ventilating duct.
  4. Clean the filter mat by using compressed air or water.
  5. Re-insert the cleaned and dried filter mat into the ventilating duct.
  6. Perform steps 1 and 2 in the reverse order.

Otherwise the transceiver is free from scheduled maintenance.

5.2 Taking Care

Such measures involve cleaning and touching up slight blemishes in the varnish coat of the transceiver. The following materials are required:

Item	Description
1	Soft brush
2	Duster
3	Cleaning compound, e.g. suds, household detergent
4	Varnish Front panel: RAL 7947 telegrey Chassis: KB90 grey

5.2.1 Cleaning

W A R N I N G

Wear goggles when working with compressed air in order to avoid eye injuries.

C A U T I O N

Direct compressed air first towards ground until no more condensed water is contained in the air jet.
Keep a minimum distance of 20 cm between compressed air and transceiver.

1. First of all clean surfaces of the unit with compressed air.
2. Continue cleaning with a soft brush or a duster.
3. Clean heavily contaminated surfaces, especially grease stains, with a soft, lint-free cloth moistened with suds.

5.2.2 Retouching the Paint Work

Touch up the paint work of the M3SR Transceiver as follows:

1. Remove any loose paint particles from the area to be retouched.
2. Clean area to be retouched with a soft, lint-free cloth soaked in suds or similar.
3. Wait for the suds to dry out.
4. Retouch with paint carefully and allow plenty of time to dry out.
5. Once the first coat is completely dry, apply a second coat and again allow it to dry. The repair is thus completed.

A1. Technical Information

Note:

For use of the M3SR Transceiver reading this appendix is not essential. This appendix provides information for anyone interested in the technical facts and figures of X. 4410A or X. 4460A.

The technical information covers the following:

- ❑ External Interfaces
- ❑ Connection of Peripheral Equipment
- ❑ Default Settings
- ❑ Inventory Structure
- ❑ Technical Data for M3SR Transceiver
- ❑ Remote Control
- ❑ Download

A1.1 External Interfaces

(see Figs. A1.1 to A1.3)

More detailed information is provided by the interface description, available on demand from Rohde & Schwarz at extra charge (order no.: 6102.4002.01SB).

* or ~ = inverted signal

A1.1.1 Service / FILL Connector X4 (only X. 4410A)

Note:

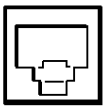
For future use.

A1.1.2 FILL Connector X5

Note:

Not used.

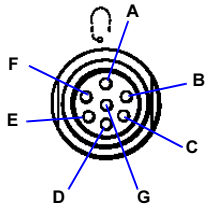
A1.1.3 LAN SERVICE Connector X6

Connector	Contact	Signal	Direction	Remarks
Recessed socket, 8-way **X6** (FT 4052.5738) SERVICE  Mating Connector: 8-way cable plug (FT 6083.5984)	1	PL_ETH_RX+	input	acc. to 10BaseT
	2	PL_ETH_RX-	input	acc. to 10BaseT
	3	PL_ETH_TX+	output	acc. to 10BaseT
	4			not connected
	5			not connected
	6	PL_ETH_TX-	output	acc. to 10BaseT
	7			not connected
	8			not connected

Note:

X6 is an MDI-X (cross-over) connector.

A1.1.4 Headset Connector X7

Connector	Contact	Signal	Direction	Remarks
Recessed socket, 7-way **X7** (FO 586.7855)  Mating Connector: 7-way cable plug (FO 0586.8239) Shrink-on part (FO 0586.8245)	A	Headphones	output	
	B	Headphones (-)		return to GND
	C	Microphone 0.5 mV	input	
	D	Microphone 0.5 mV (-)		return to GND
	E	Microphone 150 mV	input	
	F	*PTT	input	
	G	GND		for microphone 150 mV and *PTT

A1.1.5 Reference Frequency Input Connector X10

Connector	Contact	Signal	Direction	Remarks
Recessed socket, type BNC **X10** (FJ 0048.6796)  Mating Connector: Cable plug system BNC (FJ 0272.5930)	1 2	F_REF_IN GND	input	

A1.1.6 Reference Frequency Output Connector X11

Connector	Contact	Signal	Direction	Remarks
Recessed socket, type BNC **X11** (FJ 0048.6796)  Mating Connector: Cable plug system BNC (FJ 0272.5930)	1 2	F_REF_OUT GND	output	

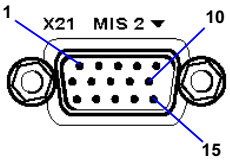
A1.1.7 LAN Connector X20

Connector	Contact	Signal	Direction	Remarks
Recessed socket, 8-way **X20** (FT 0048.9620)  Mating Connector: 8-way cable plug (FT 6083.5984)	1	PL_ETH_TX+	output	acc. to 10BaseT
	2	PL_ETH_TX-	output	acc. to 10BaseT
	3	PL_ETH_RX+	input	acc. to 10BaseT
	4			not connected
	5			not connected
	6	PL_ETH_RX-	input	acc. to 10BaseT
	7			not connected
	8			not connected

Note:

X20 is an MDI connector.

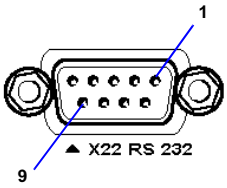
A1.1.8 Miscellaneous 2 Connector X21

Connector	Contact	Signal	Direction	Remarks
Male multipoint connector, subminiature, 15-way **X21** (FM 6104.9018)  Mating Connector: 15-way female multipoint connector (FM 1003.0866) Socket contacts (FM 1006.7410) Shielded case (FM 0586.9870)	1	RELAY_1	output	
	2	RELAY_2	output	
	3	RELAY_3	output	
	4	RELAY_4	output	
	5	USER_I/O_0		
	6	USER_I/O_1		
	7	USER_I/O_2		
	8	GND		
	9	USER_I/O_3		
	10	USER_I/O_4		
	11	USER_I/O_5		
	12	USER_I/O_6		
	13	USER_I/O_7		
	14	GND		
	15	USER_I/O_8		

Note:

User I/O for customer-specific solutions. Not supported by software (for future use). Relay contacts for control of external RF relays.

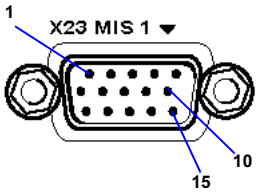
A1.1.9 RS 232 Connector X22

Connector	Contact	Signal	Direction	Remarks
Female multipoint connector, 9-way **X22** (FM 6104.9018)  Mating Connector: 9-way male multipoint connector (FM 0048.3368) Pin contacts (FM 0520.6344) Shielded case (FM 0586.9870)	1	RS 232_DCD	output	data carrier detect
	2	RS 232_RXD	output	receive data
	3	RS 232_TXD	input	transmit data
	4	RS 232_DTR	input	data terminal ready
	5	GND		
	6	RS 232_DSR	output	data set ready
	7	RS 232_RTS	input	ready to send
	8	RS 232_CTS	output	clear to send
	9	RS 232_RI	output	ring indicator

Note:

Not used in this application.
Interface for user data, e.g. to connect a DTE (data terminal equipment)

A1.1.10 Miscellaneous 1 Connector X23

Connector	Contact	Signal	Direction	Remarks
Male multipoint connector, subminiature, 15-way **X23** (FM 6104.8986)  Mating Connector: 15-way female multipoint connector (FM 1003.0866) Socket contacts (FM 1006.7410) Shielded case (FM 0586.9870)	1	TOD_A	bidirec.	time of day *)
	2	TOD_B	bidirec.	time of day *)
	3	TOD CONFIGURATION	output	reference voltage *)
	4	NOGO	output	
	5	~ZEROIZE	input	
	6	~INHIBIT_TX	input	
	7	~INHIBIT_RX	input	
	8	GND		
	9	~SOK_1	bidirec.	synchronization ok *)
	10	~BI_1	bidirec.	break-in *)
	11	~SOK_2	output	synchronization ok *)
	12	~BI_2	output	break-in *)
	13	~NE_2	output	net entry *)
	14	GND		
	15	~NE_1	bidirec.	net entry *)

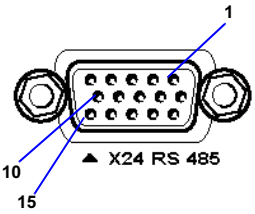
*) Used in conjunction with EPM radio modes (e.g. SECOS). Not used in this application.

A1.1.11 RS 485 Connector X24

Note:

The remote control port can be configured in Menu 425 (RADIO CONTROL PORT), e.g. to serial port standard. This results in the following contact assignments:

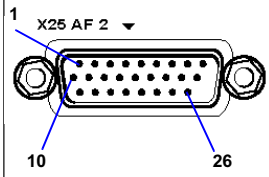
A1.1.11.1 RS 485 / RS 422

Connector	Contact	Signal	Direction	Remarks
Female multipoint connector, subminiature, 15-way **X24** (FM 6104.8986)  Mating Connector: 15-way male multipoint connector (FM 1006.4491) Pin contacts (FM 1006.4504) Shielded case (FM 0586.9870)	1	GND		signal ground
	2	RS485_B_A	input	clear to send
	3	RS485_S_A	bidirec.	clock
	4	RS485_I_A	input	data set ready
	5	RS485_R_A	input	receive data
	6	RS485_C_A	output	request to send
	7	RS485_T_A	output	transmit data
	8	GND		protective ground connected to chassis ground
	9	RS485_5V	output	
	10	RS485_B_B	input	clear to send
	11	RS485_S_B	bidirec.	clock
	12	RS485_I_B	input	data set ready
	13	RS485_R_B	input	receive data
	14	RS 485_C_B	output	request to send
	15	RS485_T_B	output	transmit data

A1.1.11.2 RS 232

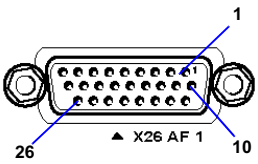
Connector	Contact	Signal	Direction	Remarks
see appendix A1.1.11.1	1	GND		signal ground
	2	CTS	input	clear to send
	3 to 4			not used
	5	RxD	input	receive data
	6	RTS	output	request to send
	7	TxD	output	transmit data
	8	GND		protective ground connected to chassis ground
	9 to 15			not used

A1.1.12 AF Interface 2 Connector X25

Connector	Contact	Signal	Direction	Remarks
Male multipoint connector, subminiature, 26-way **X25** (FM 6102.5650)	1	AF_TX2_NB_A	input	narrowband galvanic decoupling
	2	AF_TX2_NB_B	input	narrowband galvanic decoupling
	3	AF_RX2_NB_A	output	narrowband galvanic decoupling
	4	AF_RX2_NB_B	output	narrowband galvanic decoupling
	5	AGND		analog ground
	6	AF_TX2_WB_A	input	wideband
	7	AF_TX2_WB_B	input	wideband
	8	AF_RX2_WB_A	output	wideband
	9	AF_RX2_WB_B	output	wideband
	10	~PTT_LINE_2	input	for second receiver *)
	11	AGC_RX2_1	output	for second receiver *)
	12	AGC_RX2_2	output	for second receiver *)
	13	SQ_MAIN_2	output	
	14	GND		
	15			reserved
	16	USER_DEF_1	bidirec.	customer specific *)
	17	USER_DEF_2	bidirec.	customer specific *)
	18	PTT_2	input	
	19	SQ_GUARD_2	output	for second receiver *)
	20	~CARRIER	output	
Mating Connector: 26-way female multipoint connector (FM 1006.7403) Socket contacts (FM 1006.7410) Shielded case (FM 0586.9564)	21	~LINK11	output	
	22	+5V	output	
	23 to 24			reserved
	25	USER_DEF_3	bidirec.	customer specific *)
	26	USER_DEF_4	bidirec.	customer specific *)

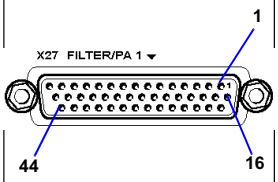
*) for future use

A1.1.13 AF Interface 1 Connector X26

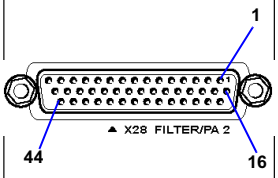
Connector	Contact	Signal	Direction	Remarks
Female multipoint connector, subminiature, 26-way **X26** (FM 6102.5650)  Mating Connector: 26-way male multipoint connector (FM 6104.9530) Pin contacts (FM 1006.4504) Shielded case (FM 0586.9564)	1	AF_TX1_NB_A	input	narrowband galvanic decoupling
	2	AF_TX1_NB_B	input	narrowband galvanic decoupling
	3	AF_RX1_NB_A	output	narrowband galvanic decoupling
	4	AF_RX1_NB_B	output	narrowband galvanic decoupling
	5	AGND		analog ground
	6	AF_TX1_WB_A	input	wideband
	7	AF_TX1_WB_B	input	wideband
	8	AF_RX1_WB_A	output	wideband
	9	AF_RX1_WB_B	output	wideband
	10	~PTT_LINE_1	input	
	11	AGC_RX1_1	output	
	12	AGC_RX1_2	output	
	13	SQ_MAIN_1	output	
	14 to 15	GND		
	16	BB/~DP	output	baseband / diphase
	17	~DPTT	output	delayed
	18	PTT_1	input	
	19	SQ_GUARD_1	output	
	20	~CARRIER	output	
	21			reserved
	22	+28 V_SW	output	switched
	23	+28 V_SW	output	switched
	24	ZEROIZE	output	
	25	PT/CT	output	plain text / cipher text
	26	CGC	input	cipher ground control

A1.1.14 Filter / Power Amplifier 1 Connector X27

Connector	Contact	Signal	Direction	Remarks
Female multipoint connector, subminiature, 44-way **X27** (FM 6104.9001)	1	28V_SW	output	switched
	2	GND		
	3	~BLK	output	blanking
	4	~TX_INHIBIT0	input	
	5	~CARRIER	input	
	6	~FM	output	
	7	~TX_RX	output	
	8	TEST1	input	
	9	VHF	output	
	10	100KHZ	output	
	11	1MHZ	output	
	12	800KHZ	output	
	13	8MHZ	output	
	14	40MHZ	output	
	15	GND		
	16	28V_SW	output	switched
	17	GND		
	18	~3DB	output	attenuation
	19	~ENABLE0	input	
	20	~VSWR	input	
	21	~PTT	output	
	22	~TX_INHIBIT1	input	
	23	~CARRIER	input	
	24	~FM	output	
	25	25KHZ	output	
	26	200KHZ	output	
	27	2MHZ	output	
	28	10MHZ	output	
	29	100MHZ	output	
	30	80MHZ	output	
	31	28V_SW	output	switched
	32	GND		
	33	UHF	output	
	34	~TX_RX	output	
	35	TEST0	input	
	36	~ENABLE1	input	
	37	~VSWR	input	
	38	~PTT	output	
Mating Connector: 44-way male multipoint connector (FM 6104.9547) Pin contacts (FM 1006.4504) Shielded case (FM 0627.1826)	39	GND		
	40	50KHZ	output	
	41	400KHZ	output	
	42	4MHZ	output	
	43	20MHZ	output	
	44	200MHZ0	output	used as 'device select' for certain filter types



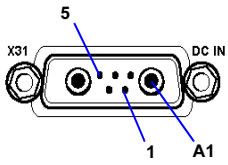
A1.1.15 Filter / Power Amplifier 2 Connector X28

Connector	Contact	Signal	Direction	Remarks
Female multipoint connector, subminiature, 44-way **X28** (FM 6104.9001)  Mating Connector: 44-way male multipoint connector (FM 6104.9547) Pin contacts (FM 1006.4504) Shielded case (FM 0627.1826)	1	28V_SW	output	switched
	2	GND		
	3	~BLK	output	blanking
	4	~TX_INHIBIT2	input	
	5	~CARRIER	input	
	6	~FM	output	
	7	~TX_RX	output	
	8	TEST1	input	
	9	VHF	output	
	10	100KHZ	output	
	11	1MHZ	output	
	12	800KHZ	output	
	13	8MHZ	output	
	14	40MHZ	output	
	15	GND		
	16	28V_SW	output	switched
	17	GND		
	18	~3DB	output	attenuation
	19	~ENABLE0	input	
	20	~VSWR	input	
	21	~PTT	output	
	22	~TX_INHIBIT3	input	
	23	~CARRIER	input	
	24	~FM	output	
	25	25KHZ	output	
	26	200KHZ	output	
	27	2MHZ	output	
	28	10MHZ	output	
	29	100MHZ	output	
	30	80MHZ	output	
	31	28V_SW	output	switched
	32	GND		
	33	UHF	output	
	34	~TX_RX	output	
	35	TEST0	input	
	36	~ENABLE1	input	
	37	~VSWR	input	
	38	~PTT	output	
	39	GND		
	40	50KHZ	output	
	41	400KHZ	output	
	42	4MHZ	output	
	43	20MHZ	output	
	44	200MHZ1	output	used as 'device select' for certain filter types

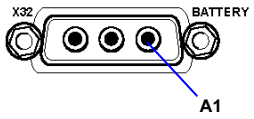
A1.1.16 Antenna Connector X30

Connector	Contact	Signal	Direction	Remarks
Recessed socket, N-type **X30** (FJ 6104.9353)  Mating Connector: Cable plug system N (FJ 0087.8850)	1 2	Antenna GND		RF Rx input / Tx output

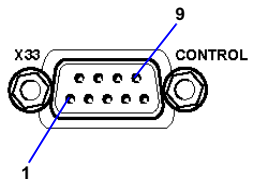
A1.1.17 DC IN Connector X31

Connector	Contact	Signal	Direction	Remarks
Multipoint connector 7-way: 2 high-current (40 A) pins + 5 auxiliary pins **X31** (FM 6105.0337)  Mating Connector: 5-way female multipoint connector (FM 0066.0173) Socket contacts (FM 0520.6338) High-current socket contacts (FP 0531.9233) Shielded case	A1 A2 1 2 3 4 5	MAIN GND PFAIL PTEMP PRET SPARE SPARE	input input input input	28 VDC nominal 100 Ω to GND

A1.1.18 Battery Connector X32

Connector	Contact	Signal	Direction	Remarks
Multipoint connector 3-way: 2 high-current (40 A) pins **X32** (FM 0070.0780)  Mating Connector: 3-way female multipoint connector (FM 0070.0800) High-current contacts (FP 0531.9233) Shielded case (FM 0586.9564)	A1 A2 A3	GND SPARE BATTERY	 input	 19 to 31 VDC

A1.1.19 External Supply Connector X33

Connector	Contact	Signal	Direction	Remarks
Female multipoint connector, 9-way **X33** (FM 0243.1346)  Mating Connector: 9-way multipoint connector (FM 0048.3368) Pin contacts (FM 0520.6344) Shielded case (FM 0586.9870)	1 2 3 4 5 6 7 8 9	28V_EXT GND ON GND 28V_EXT_SW 28V_EXT OFF 28V_EXT_SW 28V_EXT_SW	output input output output input output output	 switched switched switched

A1.1.20 Rx Antenna Connector X5031 (Part of Antenna Interface GI 4403)

Connector	Contact	Signal	Direction	Remarks
Recessed socket, type BNC **X5031** (part of W2: DV 6103.4864)  Mating Connector: Cable plug system BNC (FJ 0272.5930)	1 2	Antenna Rx GND	input	

A1.1.21 GRx Antenna Connector X5032 (Part of Antenna Interface GI 4403, Mod. 04)

Connector	Contact	Signal	Direction	Remarks
Recessed socket, type BNC **X5032** (part of W1: DV 6103.4858)  Mating Connector: Cable plug system BNC (FJ 0272.5930)	1 2	Antenna GRx GND	input	

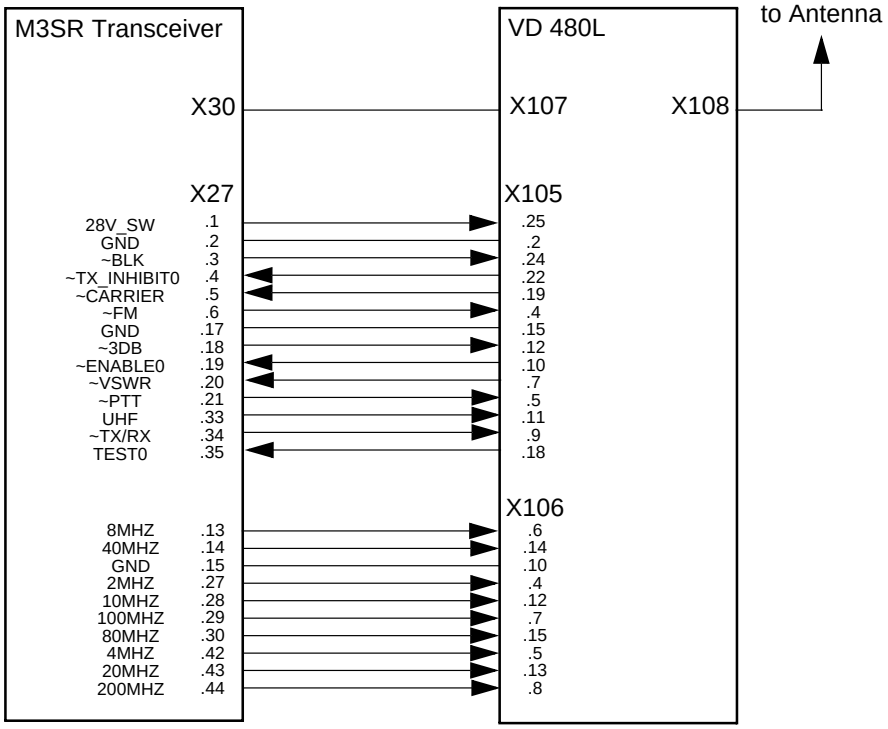
A1.2 Connection of Peripheral Equipment

A1.2.1 UHF Power Amplifier VD 480L

When frequencies outside the frequency range of 225 to 400 MHz or communication mode LINK 11, UHF Power Amplifier VD 480L will be bypassed.

The following CBIT messages relating to UHF Amplifier VD 480L may occur:

- ❑ 601: IF CBIT OF EXT AMP
- ❑ 602: IF VSWR OF EXT AMP



Make sure that in UHF Power Amplifier VD 480L the jumpers for connector X400 are set as follows (see also User Manual 6045.5822.12), otherwise an error message may come up:

- X400.1 and .2: jumper (voltage error)
- X400.3 and .4: no jumper (no input power monitoring)
- X400.5 and .6: jumper (VSWR error)

When selecting the power level, bear in mind that VD 480L can be driven with max. 25 W.

Starting point: Menu 040 (MAIN)

1. Press softkey 

Menu 400 (RADIO MAINTENANCE)

2. ENTER maintenance PIN by using the numerical keypad, then press ENTER.

3. Press softkeys 

Menu 510 (RADIO MODULES)

4. Press softkey 

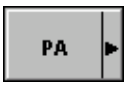
5. Select module VU POWER AMPLIFIER by using the tunig knob.

6. Press softkey 

Menu 516 (VU TX PARAMETERS)

7. Press softkey 

8. Select UHF Power Amplifier VD 480L by using the tuning knob, then press ENTER.

9. Press softkey 

10. Select UHF Power Amplifier VD 480L by using the tuning knob, then press ENTER.

11. Press softkey 

12. Select power level LOW by using the tuning knob, then press ENTER.

13. Press softkey 

14. Enter a new power level, e.g. 1 W, by using the numerical keypad, then press ENTER.

15. Press softkey 

16. Enter a new power level, e.g. 5 W, by using the numerical keypad, then press ENTER.

17. Press softkey 

to e.g. deactivate the power level setting (LOW).

18. Press softkey 

19. Select power level MED by using the tuning knob, then press ENTER.

20. Press softkey 

21. Enter a new power level, e.g. 2 W, by using the numerical keypad, then press ENTER.

22. Press softkey 

23. Enter a new power level, e.g. 10 W, by using the numerical keypad, then press ENTER.

24. Press softkey 

to e.g. deactivate the power level setting (MED).

25. Press softkey 

26. Select power level HIGH by using the tuning knob, then press ENTER.

27. Press softkey 

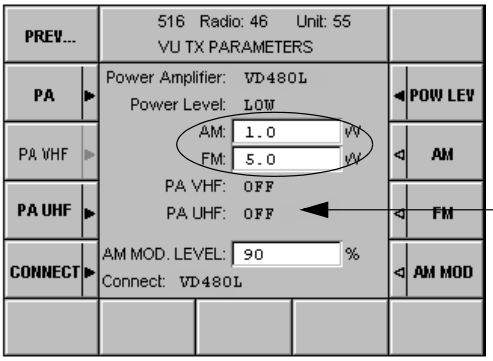
28. Enter a new power level, e.g. 12 W, by using the numerical keypad, then press ENTER

29. Press softkey 

30. Enter a new power level, e.g. 15 W, by using the numerical keypad, then press ENTER.

31. Press softkey 

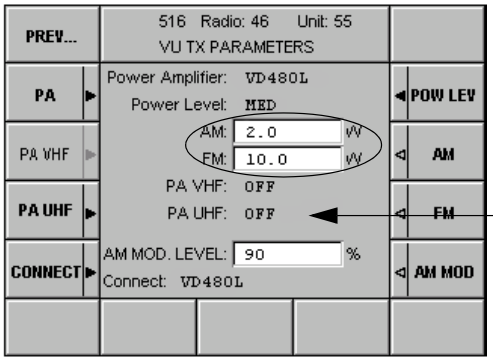
to e.g. activate the power level setting (HIGH).



Since the power amplifier is deactivated (PA UHF = OFF), the default values are used for PTT instead of the values configured for AM or FM.

Default values:

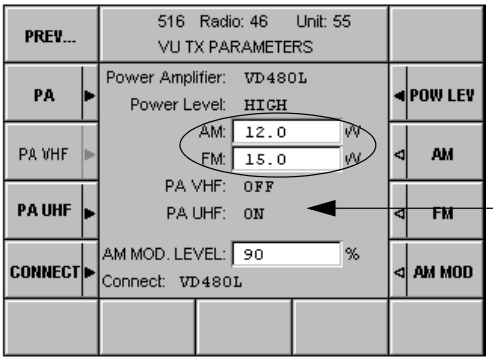
AM = 3 W
FM = 5 W



Since the power amplifier is deactivated (PA UHF = OFF), the default values are used for PTT instead of the values configured for AM or FM.

Default values:

AM = 10 W
FM = 10 W



Since the power amplifier is activated (PA UHF = ON), the configured values are used for PTT instead of the default values.

Configured values:

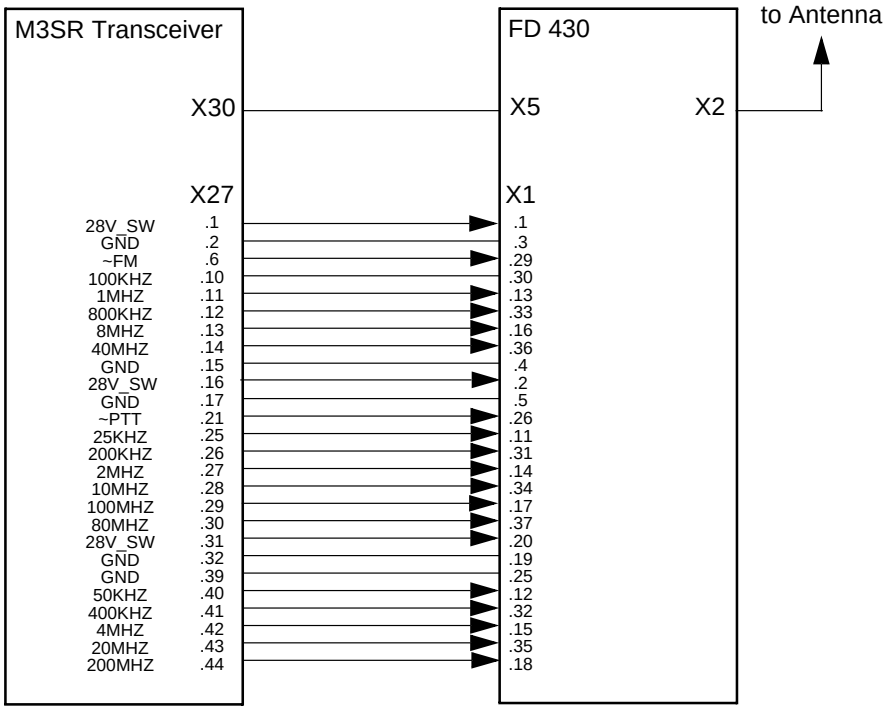
AM = 12 W → 12 W x gain of VD 480L
FM = 15 W → 15 W x gain of VD 480L

A1.2.2 UHF Agile Filter FD 430

The UHF Agile Filter FD 430 can be used in all communication modes.

Only frequencies from the frequency range 225 to 400 MHz are permitted to be used.

Softkey PA UHF has no function, because FD 430 is active always and cannot be bypassed.



When selecting the power level, bear in mind that UHF Agile Filter FD 430 can be driven with max. 10 W (AM) or 15 W (FM).

Starting point: Menu 040 (MAIN)

1. Press softkey 

Menu 400 (RADIO MAINTENANCE)

2. ENTER maintenance PIN by using the numerical keypad, then press ENTER.

3. Press softkeys 

Menu 510 (RADIO MODULES)

4. Press softkey 

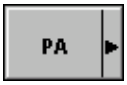
5. Select module VU POWER AMPLIFIER by using the tuning knob.

6. Press softkey 

Menu 516 (VU TX PARAMETERS)

7. Press softkey 

8. Select UHF Agile Filter FD 430 by using the tuning knob, then press ENTER.

9. Press softkey 

10. Select UHF Agile Filter FD 430 by using the tuning knob, then press ENTER.

11. Press softkey 

12. Select power level LOW by using the tuning knob, then press ENTER.

13. Press softkey 

14. Enter a new power level by using the numerical keypad, then press ENTER.

15. Press softkey 

16. Enter a new power level by using the numerical keypad, then press ENTER.

17. Press softkey 

18. Select power level MED by using the tuning knob, then press ENTER.

19. Press softkey 

20. Enter a new power level by using the numerical keypad, then press ENTER.

21. Press softkey 

22. Enter a new power level by using the numerical keypad, then press ENTER.

23. Press softkey 

24. Select power level HIGH by using the tuning knob, then press ENTER.

25. Press softkey 

26. Enter a new power level by using the numerical keypad, then press ENTER.

27. Press softkey 

28. Enter a new power level by using the numerical keypad, then press ENTER.

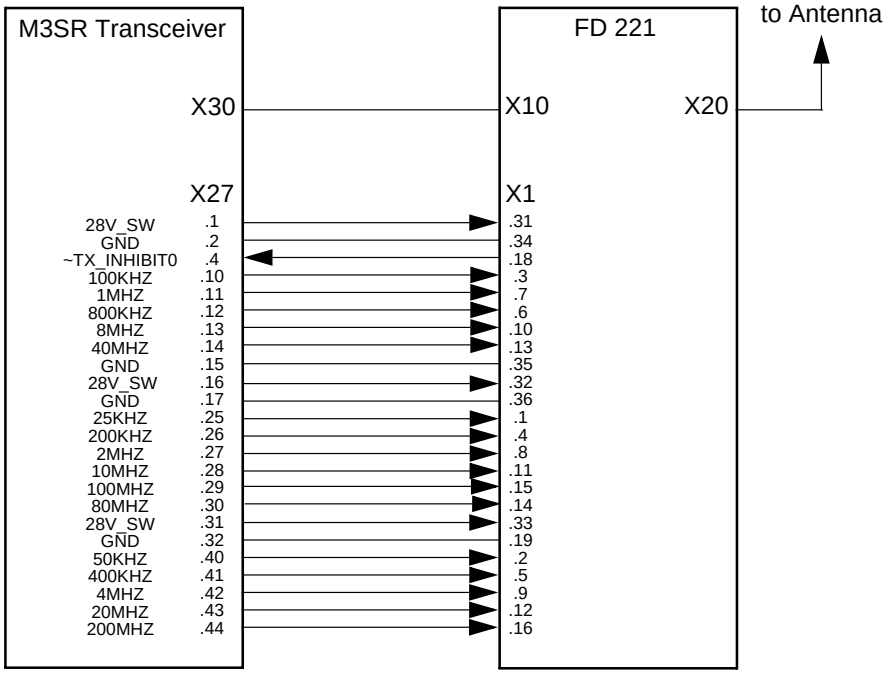
A1.2.3 UHF Automatic Filter FD 221

UHF Filter FD 221 can be used in all communication modes.

Only frequencies from the frequency range between 225 and 400 MHz are permitted to be used.

Filter tuning is monitored by signal ~Tx_INHIBIT0 (contact X27.4). As long as filter tuning is in progress, the transmitter is disabled. If tuning fails to be completed within approximately 20 s, the message " 603: EXT PA TUNING X27" comes up.

No setup procedures are required in the M3SR Transceiver.



A1.3 Default Settings

There are two different scenarios for default settings to become active:

- ❑ The radio is powered up for the first time.
- ❑ The radio is reset during operation by using softkey DEFAULT SETTINGS in Menu 400. In this case only the maintenance parameters will be reset, all other parameters are not affected. In the tables below, such parameters non-affected by a reset are marked by an "N" in the last column.

Frequency	310 MHz (UHF and VHF/UHF)	
Mode	FIX.FRQ	
Guard	OFF	
Power	HIGH	
Modulation	AM	
Squelch	ON	
Marker	OFF	
H-Duplex H-Duplex RX H-Duplex TX	OFF 310 MHz (UHF and VHF/UHF) 311 MHz (UHF and VHF/UHF)	
Clipper	OFF	
COMM	V/D UNCPH	
Chan SP	25 kHz	
Tx Offs	OFF	
AF AGC	OFF	
Preset No.	0	
Band	UHF	
Radio Time Date	00:00 01.01.70	N N
Default Address Radio	Logical 46 IP 192.168.052.046 T R	N

Radio Modules	Slot 0 VU GRX, ALL Slot 3 VU SYN, CL1 Slot 4 VU RX, CL1 Slot 17 VU TX, CL1 Slot 18 PLAT, ALL Slot 19 AFI, CL1 Slot 20 PLAT INT, ALL	N N N N N N N
Operation type	Manual	
Remote Control RS485 (X24)	9 600, 7, 1, ODD, RS485, S400U protocol	

Module Parameters CPLAT:

RX	SQ Level S/N	10 dB	
	Input	RXTX or RX *Note:* *In conjunction with Antenna Interface GI 4403 and without UHF Filter FD 4430 select RX, in all other cases RX/TX input.*	N
	Clipper Level	90%	
	Sensitivity	LN	
	Attack	10 ms	
	Decay	100 ms	
TX	AM TX Power	3, 10, 30	
	FM TX Power	5, 10, 45	
	AM MOD	90%	
	Voltage Protection	ON	
	External Power Amplifier	None	
	External Filter	None	
SY (Parameters for AFI)	TX Deviation WB	6.3 kHz	
	TX Deviation NB	3.5 kHz	
	TX Deviation L11	20 kHz	
	TX Deviation TRIM	0%	N
Plat	VCXO	2 047	N
	TCXO	2 047	N
	OCXO	32 767	N
	Ref Out	10 MHz	
	EXT REF	OFF	
	REF IN INPUT	OFF	
	PWR SUP	MAIN	
	CLK SRC	OCXO (if unavailable: TCXO)	
AFI	TX ALC	ON	
	RX LEVEL	0 dBm	
	TX LEVEL	0 dBm	
	TX ALC Attack	30 ms	
	TX ALC Decay	300 ms	
	TX ALC Level	0 dB	
	Marker Volume	-1.5 dB	
	Guard Volume	0 dB	
	Sidetone Volume	-6 dB	
Split Site		Simple	

Standby	not selectable	
PTT Mapping	PTT1 CL1 low PTT1L Rem CL1 low PTT2 CL1 high PTT2L Rem CL1 low	
Phantom Mapping	not selectable	
Audio Mapping	WB1 none NB1 to CL1 WB2 to CL1 NB2 none	
Device Mapping	All none, no CL assigned	
SQ Polarity	All low	
Audio Source Source	1 = CL1 2 = Guard U/V	
Marker Control	Disabled	
Local Mode	OFF	N
PINs	All PINs set to 00000	N

Default values for Setup:

Active Preset	1	N
Preset Count	1	N
No. of Pages	200	N

Default values for Control Unit GB 4000C

Default Address Control Unit	Logical 47 IP 192.168.052.047 T C	N
Contrast	100%	N
Brightness	100%	N
Display Timer	60 min	N
Indicators	100%	N
Key Illumination	100%	N
Frequency	ICAO	N
Date Format	YYYY / MM / DD	N

A1.4 Inventory Structure

In Menu 415 INVENTORY all components installed in the radio are listed:

e.g. XT4410A (DEV)	DS 4400A PACK (SWM)	PLATFORM (SW)
		BOOTPROG (FW)
	KR 4400 BASIS (HWM)	PLATFORM (HW)
		FRONT PANEL B (HW)
		DSP MODULE (HW)
		CPLD KR 4400 (FW)
		ACPCB ws EQI (FW)
		DSP KR 4400 (FW)
		DSP CPLD (FW)
	ET 4400 REC (HWM)	RECEIVER B (HW)
		FLASH ET 4400 (FW)
	ET 4400G REC (HWM)	GUARD REC B (HW)
		FLASH ET 4400G (FW)
	GF 4400T SYNTH (HWM)	SYNTHESIZER B (HW)
		VCO BOARD (HW)
		XIL GF 4400T (FW)
		ALT GF 4400T (FW)
	VT 4403 TRANSM (HWM)	TRANSMITTER B (HW)
		DRIVER AMP (HW)
		POWER SUPPLY (HW)
		DSP VT 4403 (FW)
		DSP CPLD (FW)
	FD 4430 UHF (HWM)	FW XILINX (FW)
		HF BOARD (HW)
		DIGITAL BOARD

In Menu 815 INVENTORY all components installed in the control unit are listed:

	GB 4000C CONTR (HVM)	CONTROLLER B (HW)
		FRONT PANEL B (HW)
		ACPCB ws EQI (FW)
		CONTR GB 4000C (SW)
		BOOTPR GB 4000C (FW)

A1.5 Technical Data

See data sheet for Digital Programmable Software Radios of Series M3SR in the annex.

A1.6 Remote Control

For remote control of the M3SR Transceiver two different serial connections may be used:

Serial Connection	Serial Port Standard	Protocol	Note
X6 / X20	LAN	GB2PP	Multipoint connection (TCP IP addressing)
X24 *)	RS232 RS422	GB2PP	Point-to-point connection
	RS232 RS422	S400U	Point-to-point connection
	RS485	S400U	Multipoint connection (with CSMA/CD)

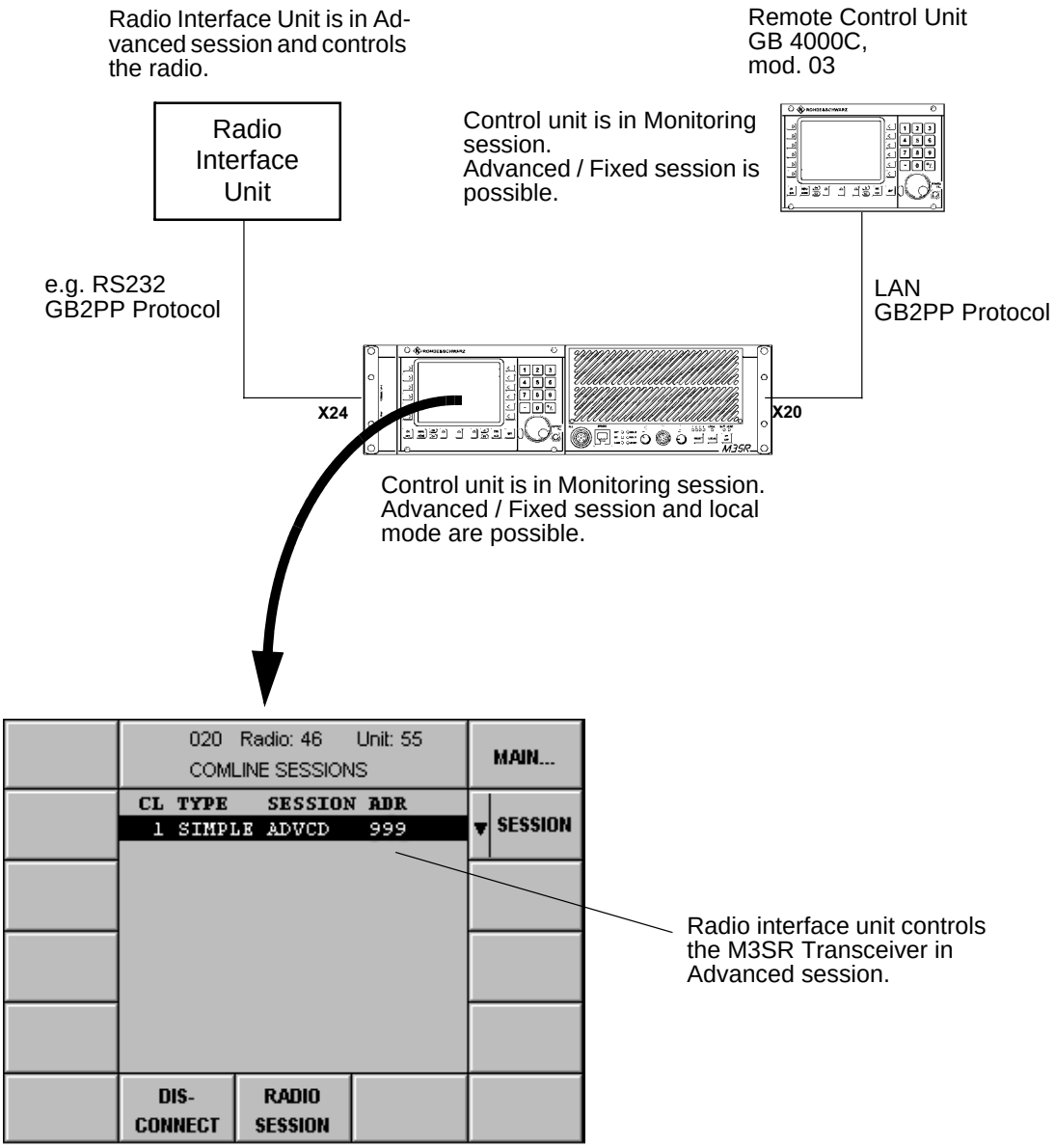
*) The protocol and the serial port standard for the serial connection X24 can be configured via Menu 425 (SERIAL CONTROL INTERFACE).

The following table shows the difference between the protocols:

	S400U	GB2PP
Operation mode:		
• Manual	**X** (only FF)	**X**
• Preset	**X** (only FF)	**X**
• Emergency	**X** (only FF)	**X**
Radio maintenance	-	**X**
Preset Page setup	-	**X**
CBIT status	**X**	**X**
Error List:		
• Read	-	X
• Clear	-	X
Start of IBIT	-	X
Session control	-	X

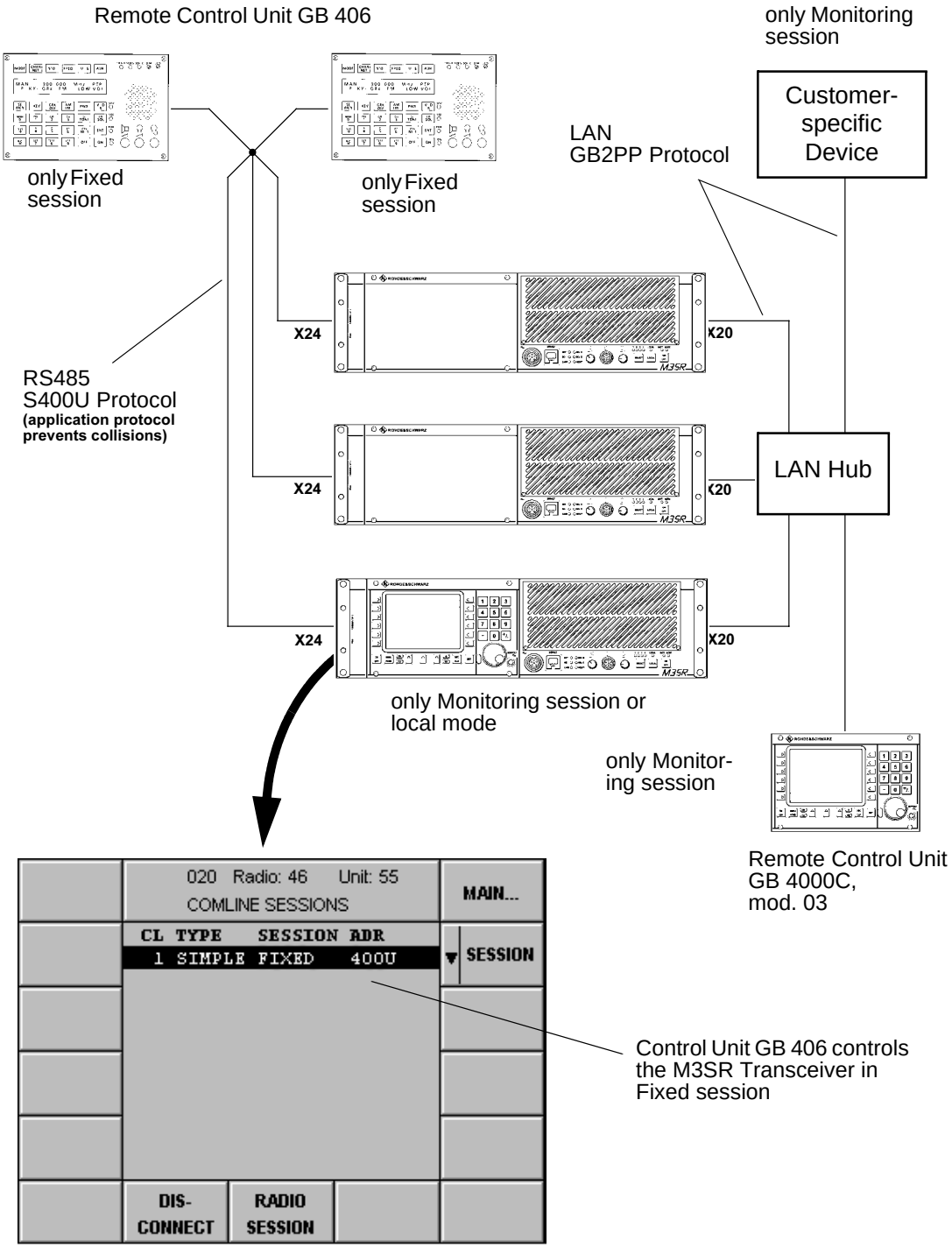
x = supported FF = fixed frequency

A1.6.1 Remote Control via RS422 Connector X24 and GB2PP Protocol



The Radio Interface Unit (RIU) uses the GB2PP protocol to control the radio. When the RIU has connected to the radio in an Advanced session, all other control units may take control of the radio any time. For this to happen, only the session needs to be changed from Monitoring to Advanced or Fixed. Menu 020 (COMLINE SESSION) contains an indication that the radio is being controlled by an RIU (ADR = 999) in Advanced session.

A1.6.2 Remote Control via RS485 Connector X24 and S400U Protocol



As soon as a radio address has been configured on one of the Control Units GB 406, this control unit will automatically connect to the radio in Fixed session. All other control units will only be able to monitor. Menu 020 (COMLINE SESSION) contains an indication that the S400U protocol is being used for radio control (ADR = 400U).

A1.7 Download

❑ Software Download

A software CD is delivered together with each radio. The software CD contains the complete Software Package. The Software Package itself consists of various software and firmware items. The following table (example for fullband transceiver = XT) shows which software and firmware items are upgradable.

Type	Name	Ident. No.	Version	Upgradable	Remark
SWM	DS4400A Pack	6102.2068.05 6102.2051.04	01.00 01.00	yes yes	with Link 11 without Link 11
SW	PLATFORM	6103.6021.03 6103.6038.03	03.72 03.72	yes yes	with Link 11 without Link 11
FW	BOOTPROG	6102.5621.02	12.03	no	
FW	CPLD KR4400	6102.5609.02	01.00	no	
FW	ACPCB ws EQI	6105.6412.06	01.27	yes	
FW	DSP KR4400	6102.5644.02	03.46	yes	
FW	DSP CPLD	6105.8550.02	01.02	no	
FW	FLASH ET4400	6102.7118.02	01.33	yes	
FW	FLASH ET4400G	6102.8614.02	01.03	yes	
FW	XIL GF4400T	6102.6611.02	04.00	yes	
FW	ALT GF4400T	6102.6605.02	04.00	yes	
FW	DSP VT4403	6102.7599.02	03.36	yes	
FW	DSP CPLD	6105.8550.02	01.02	no	
SW	CONTR GB4000C	6103.6109.02	03.72	yes	only X. 4410A
FW	BOOTPR GB4000C	6105.6406.02	12.03	no	only X. 4410A
FW	ACPCB ws EQI	6105.6412.06	01.27	yes	only X. 4410A
FW	FW XILINX	6103.2084.02	01.08	no	FD 4430

In addition, the software CD contains the Update32 and Service- and Maintenance Tool ZS 4400 (basis edition) for upgrading the software, as well as a list of known software bugs. The software CD can be reordered any time by stating the ident. no. of the DS4400A Pack (e.g. 6102.2068.05).

The manufacturer provides tools to download these data. The download can be performed via LAN by using connectors X6 (front) and X20 (rear). The actual download tool runs on any standard PC supporting Windows NT4™ or Windows W2k™.

For detailed information please contact the manufacturer's representative in charge.

Update 32 Tool

The Update 32 Tool is contained on the software CD that is delivered with each M3SR Transceiver. Downloading the software is done in a number of single steps. Please follow the instructions in the Software Manual of the Update 32 Tool (ident. no. 6076.0168.42). It is also contained on the software CD. Another, more comfortable means for upgrading is the Service and Maintenance Tool ZS 4400.

Service & Maintenance Tool ZS 4400 (ident. no. 6105.2600.02)

The Service & Maintenance Tool automatically compares the software and firmware loaded in the M3SR Transceiver with that on the software CD. In the case that any difference is detected, the required upgrade is performed also automatically.

Please follow the instructions in the Software Manual of Service & Maintenance Tool ZS 4400.

❑ Loading the Preset Pages into the Radio

Control Unit GB 4000C

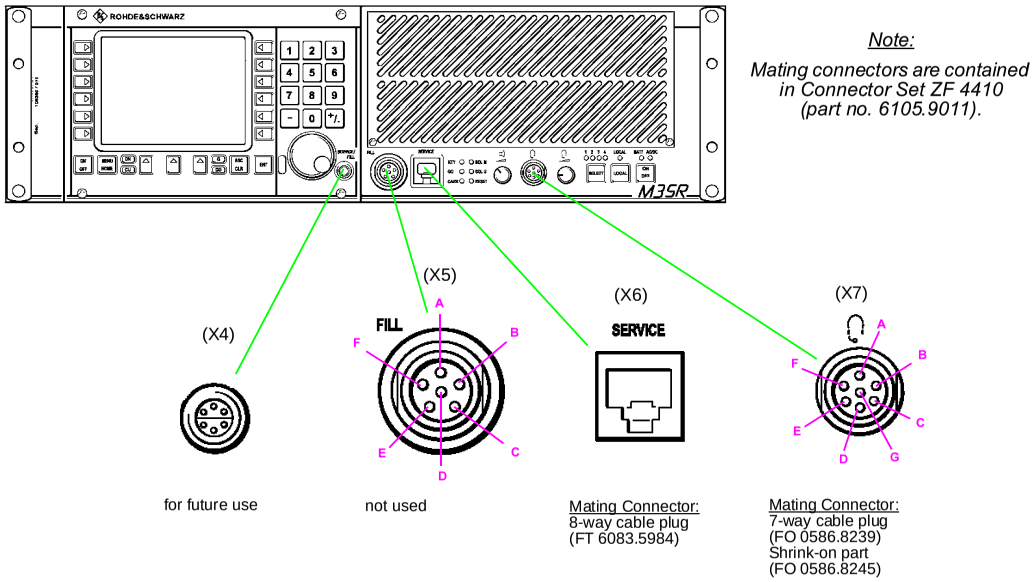
The Preset Pages can be entered manually via the following menus:

- 620 (LOADED PRESET PAGES PARAMS) and
- 710 (EDIT PRESET PAGE (FIX.FRQ).

Service & Maintenance Tool ZS 4400 (ident. no. 6105.2600.02)

The Service & Maintenance Tool can be used to retrieve from the radio (reference device) all Preset Pages that have been edited manually, to duplicate them in a second step into other radios.

Please follow the instructions in the Software Manual of Service & Maintenance Tool ZS 4400.



Note:

Mating connectors are contained in Connector Set ZF 4410 (part no. 6105.9011).

Fig. A1.1 External Interfaces of X. 4410A (Front)

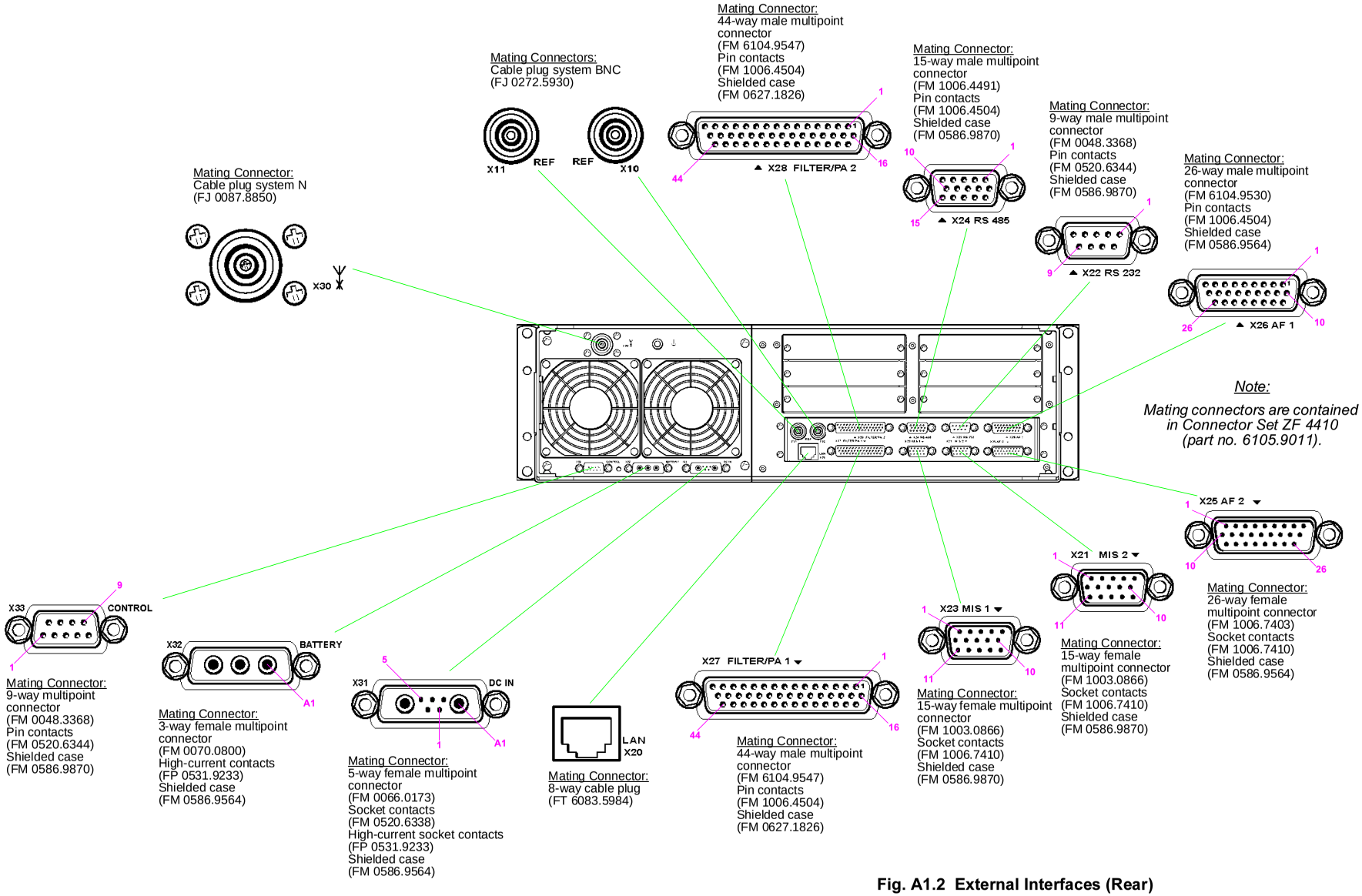


Fig. A1.2 External Interfaces (Rear)

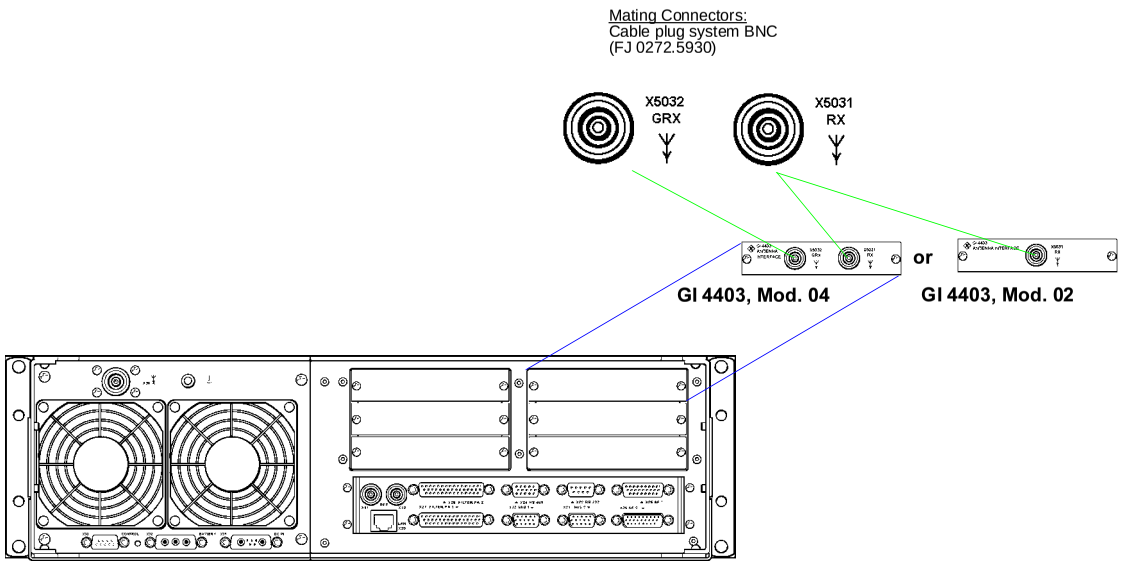


Fig. A1.3 External Interfaces (Rear Modules)

Digital Reprogrammable Software Radios R&S M3SR

Your key to interoperability

- High operational flexibility while on mission
- Interoperability with existing radios according to international standards
- Easy system integration
- Low life cycle costs
- Software download of new waveforms
- High growth potential through P^3I (preplanned product improvement)
- Embedded hopping filter optionally available

M3SR

ROHDE&SCHWARZ

The R&S M3SR (multiband, multimode and multirole surface radio) represents an innovative and versatile generation of software radios for use in the navy, civil and military air traffic control, air defence and stationary applications.

In addition to the R&S M3TR (multiband, multimode and multirole tactical radio) and R&S M3AR (multiband, multimode and multirole airborne radio), the R&S M3SR is the third element of a new radio equipment generation. All three feature functionality that can be varied by means of software.

For the commercial user, the basic units come standard with the waveform for air traffic control (ATC) in line with EN300676. The R&S M3SR can be used both in normal ATC operation and as an emergency backup radio.

The R&S M3SR is interoperable with many types of existing radio equipment and standards. For military customers, this means seamless communication with their own and allied troops. To communicate with neighbouring troops, the radio is switched to the waveform or communication protocol used there. This switchover can be carried out online even during a mission.

The operational functions and the available waveforms are determined by the loaded application software. Additional functions can be implemented, as required, by downloading the appropriate software and/or using plug-in hardware modules.

Modular design

The R&S M3SR features highly modular hardware and software architecture. All R&S M3SR units are based on the uniform Radio Basis R&S KR4400. The versatile P^3I upgrade concept of the basic version helps to avoid unnecessarily high initial investment costs.

The R&S M3SR is available as a receiver, transmitter or transceiver, according to the customer's requirements.

Radio Basis R&S KR4400

The various models are set up on the hardware and software of the Radio Basis R&S KR4400, which forms the central and common part of all R&S M3SR radios. The radio basis is independent of the RF-specific modules. Additional radio-specific hardware and software modules define the performance features of the radio.

The R&S KR4400 consists of the mechanical frame, the radio platform and a front panel with audio interface, loudspeaker and status displays. The platform is the control center of the radio. The embedded realtime operating system controls and monitors all functions in the radio. A control panel (R&S GB4000C) can be integrated for local control of the radios.

The main tasks of the radio basis include:

- Monitoring and control of the complete radio unit
- Mechanical and electrical accommodation of modules and control panel
- Digital voice and data processing
- Internal routing of information data to the interfaces
- Standard interfaces to peripherals
- Audio interface, loading of encryption keys and display of status information

An oven-controlled crystal oscillator (OCXO) is integrated as standard to meet the stringent requirements regarding time stability.

For the configuration of the various radio models, the radio basis is equipped with slots for the radio modules, and a mechanical fixture on the side to accommodate the transmitter module.

Key features of the modules

The modules have the following outstanding features:

- Independent use of all modules (no alignment or manual adjustment when modules are replaced)
- Central download of software and firmware (no need to open the radio unit)
- Data exchange via radio module bus
- Type label with bar code identification down to PCB level (fast automated detection and identification)
- All modules with electromagnetic shielding (maximum EMC/EMI immunity)
- All settings made via software (reduced maintenance)
- Fast and easy replacement of modules (short MTTR)

Modules for radio module slots

VHF/UHF Synthesizer Module R&S GF4400T

The synthesizer module is the core of the high-frequency structure of the radio unit. It covers the frequency range from 100 MHz to 512 MHz, generates the RF signal for driving the transmitter and supplies the local oscillator (LO) signal for the receiver module. Direct digital synthesis (DDS) technology ensures fine frequency tuning with high accuracy and high speed. The extremely low-noise signal generation allows the radio to be used at sites with stringent requirements regarding large-signal immunity (collocation).

VHF/UHF Receiver Module R&S ET4400

The Main Receiver Module R&S ET4400 can be universally used for all operational modes in the VHF/UHF range. The use of programmable VLSI components makes the module extremely compact, occupying only one slot. The flexible digital demodulator allows the processing of complex digital waveforms.

VHF/UHF Guard Receiver R&S ET4400G

The R&S ET4400G simultaneously monitors the emergency frequencies in the VHF (121.5 MHz) and UHF (243 MHz) ranges and can be installed in any R&S M3SR model, irrespective of the other modules. The AF of the guard receiver can either be routed to one of the audio interfaces or mixed with the AF of the main receiver. The software for using a guard receiver is supplied with the basic unit.

Electronic Protective Measures (EPM) Processor Module R&S GP4400

The powerful EPM Processor Module R&S GP4400 handles data processing for special waveforms. It occupies one radio module slot and can host EPM waveforms such as SATURN, SECOS or HAVE QUICK I/II on its memory devices. Its functionality is determined by the loaded software.

Power modules

VHF/UHF Transmitter Module R&S VT4403

The R&S VT4403 is a universal transmitter module for all operational modes in the frequency range 100 MHz to 512 MHz and is mounted in the R&S KR4400. This means that there is one transmitter for each radio. A PIN diode switch is provided for fast and reliable switchover between transmission and reception. Two low-noise, temperature-controlled fans are provided on the rear panel for heat dissipation of the transmitter.

Main Receiver Module R&S ET4400

Internal AC/DC Power Supply R&S IN4400A

The R&S IN4400A is the internal AC/DC power supply required for receiver and multireceiver radio types. Its submodules are an AC/DC converter and a DC/DC converter. The AC/DC converter delivers DC from the external mains supply. The R&S IN4400A occupies the slot assigned to the transmitter module. The external Universal Power Supply R&S IN4000A is required for transceivers or transmitters.

Local control panel

A local control panel can be integrated in the front of the Radio Basis R&S KR4400. If a local control panel is not required, a blank panel is fitted instead.

Comfort Control Panel (CCP) R&S GB4000C

The ½ 19" plug-in CCP is the standard control panel and allows easy and convenient local control of the radio. All radio functions are controlled by the R&S GB4000C. The 5" display has softkeys and a user-friendly, menu-guided user interface. The keypad is backlighted by LEDs. Any additional R&S M3SR units that are connected can be controlled and monitored from a local control panel.

Interfaces

In addition to the interfaces provided as standard, interface cards can be inserted. Six free slots are available for interface cards. These cards may contain customer-specific interfaces as well as other functions.

Backplane R&S GH4400

The Backplane R&S GH4400 connects the optional interface cards and the transmitter module to the radio module bus. This passive PCB does not occupy a radio module slot. The Backplane R&S GH4400 is required for every R&S M3SR configuration except receivers, which do not need interface cards.

Antenna connector configurations

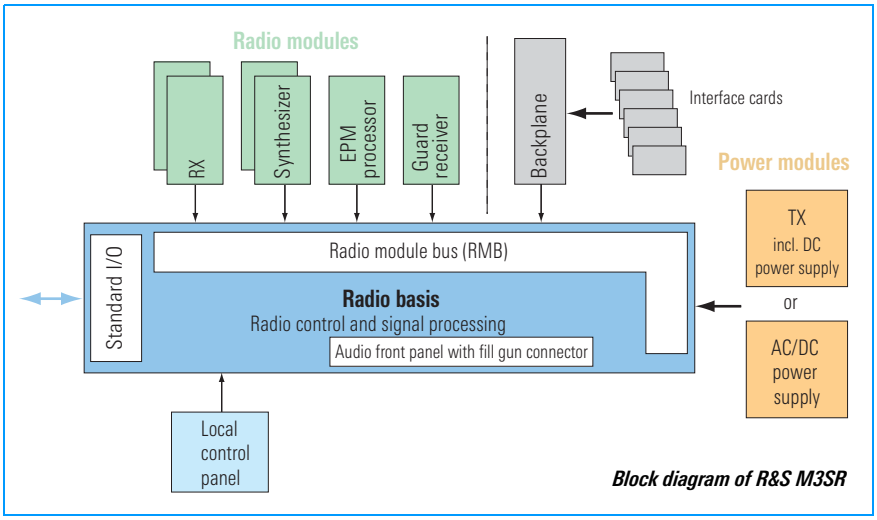
The connector for a combined transmitting/receiving antenna is configured as standard. Depending on the antennas used, various connector combinations are offered. This means that either separate or combined antenna connectors are available for main receiver, guard receiver and transmitter.

Due to the use of a universal wideband amplifier, only one antenna connector is required, irrespective of the frequency range. If separate operation of the VHF and UHF range is required for special applications, an external diplexer (e.g. R&S FT224) has to be used.

Remote control

A variety of standardized interfaces is available for remote control of the radio units. An integrated LAN (local area network) hub allows easy integration into data networks. Any number of radios can thus be controlled from a central operator position.

The R&S M3SR radios can be remote-controlled via external remote control units, other R&S M3SR units with integrated control panel, Rohde&Schwarz remote control systems or customer-specific solutions.



Block diagram of R&S M3SR

Built-in test (BIT) concept

An efficient BIT concept allows identification and location of functional failures down to module level. All failures detected during the test can be indicated locally and remotely.

- Power-up BIT (PBIT)
  Automatic test after power-up of the unit
- Continuous BIT (CBIT)
  Automatic start after successful PBIT and continuous and automatic monitoring of all modules including radio basis during operation
- Initiated BIT (IBIT)
  Interactive test in non-operating status to support maintenance of the radio units; can be triggered locally or remotely; test and analysis of the signal path in the radio with the aid of test signals without disconnecting the antenna connector (test signal generator already built in; simplified diagnostics possible without opening the unit)

Radio failure archive

All failures detected and error messages are stored in the radio failure archive. The archive can be read locally on the CCP and remotely. Each entry also contains a description in plain text.

Inventory report

The software and hardware states of the radio system are entered in full detail into the inventory report. The report allows a fast overview of the total configuration status without having to open the unit.

Power supply concept

Transceivers and transmitters are supplied from DC. The external Universal Power Supply R&S IN4000A or other AC/DC sources provide AC supply for the radios.

Receivers and multireceivers have an integrated AC/DC power supply (R&S IN4400A).

Radio type / Power supply	Receiver	Transmitter	Transceiver
DC	integrated	integrated	integrated
AC/DC	integrated	external R&S IN4000A	external R&S IN4000A

Specifications for basic fixed-frequency radio

Common data for transmitter, transceiver and receiver radio configurations

Unless stated otherwise, specs are valid for the frequency range from 108 MHz to 174 MHz and 225 MHz to 400 MHz. For the remaining ranges down to 100 MHz and up to 512 MHz, minor deviations may occur.

Usable frequency range	100 MHz to 512 MHz without gap
Waveforms contained in standard radio configuration	VHF (108 MHz to 173.975 MHz): LOS FM LOS AM Civil ATC AM acc. to EN300676 UHF (225 MHz to 399.975 MHz): LOS FM LOS AM
Optional waveforms	– HAVE QUICK I/II acc. to STANAG4246 – SATURN acc. to STANAG4372 – UHF DAMA with external modem acc. to MIL-STD-188-181/2/3 on request – Link 11 with external modem acc. to STANAG5511 – Link 22 with external modem acc. to STANAG5522 on request – Link 4A with external modem acc. to STANAG5504 on request – Link Y Mk2 with external modem on request – SECOS voice, Rohde&Schwarz TRANSEC/COMSEC waveform – SECOS with data preprocessor (DPP) – SECOS with TDMA on request – other waveforms on request
Channel spacing	8.33 kHz, 25 kHz, 75 kHz (HAVE QUICK mode)
Frequency spacing	8.33 kHz, 12.5 kHz and 25 kHz synthesizer increments
Frequency drift (–20 °C to +55 °C)	<0.1 ppm (10^{-7}) with OCXO
Frequency offset (for TX only)	up to 4-carrier offset mode ±2.5 kHz/5 kHz/7.5 kHz 5-carrier offset mode on request
Preset pages (channel configuration, including all operational parameters)	200
Classes of emission	AM: A3E, A9E, AXX (16 kbit/s baseband and diphase) FM: F3E, F9E, FSK, FSK-MSK

Receiver data

Sensitivity	
With AM (m = 0.3)	≤–107 dBm (low-noise mode) ≤–101 dBm (low-distortion mode)
With FM (±3.5 kHz deviation)	≤–110 dBm (low-noise mode) ≤–104 dBm (low-distortion mode)
For (S+N)/N = 10 dB (weighted to ITU-T) and f_m = 1 kHz	
Note: If a guard receiver with common main receiver antenna is installed in an R&S M3SR, the sensitivity of the main receiver is reduced by 4 dB.	
AM internal noise level (with input signal –47 dBm, f_m = 1 kHz, m = 0.3)	(S+N)/N ≥40 dB (modulated-to-unmodulated), weighted to ITU-T
FM noise quieting (with input signal –70 dBm, f_m = 1 kHz; deviation = ±3.5 kHz)	(S+N)/N ≥40 dB, weighted to ITU-T
Selectivity (IF bandwidth)	
Main RX BW 1 for 25 kHz channel spacing BW 2 for 8.33 kHz channel spacing BW 3 for data BW 4 for data	 ≥26 kHz/6 dB, ≤50 kHz/80 dB ≥7 kHz/6 dB, ≤13 kHz/60 dB ≥50 kHz/6 dB, ≤150 kHz/70 dB ≥70 kHz/6 dB, ≤140 kHz/60 dB
RFI (radio frequency interference) suppression	
Adjacent-channel rejection	VHF ATC band acc. to EN300676 ≥60 dB for 8.33 kHz and 25 kHz channel spacing
Desensitization S+N/N >10 dB, weighted to ITU-T	 wanted signal –95 dBm/m = 0.6, unwanted signal +80 dBc VHF at >±200 kHz UHF at >±200 kHz
IF/image rejection	≥80 dB
Spurious rejection	80 dB
Suppression of 3rd order intermodulation products Low-distortion mode, ref = –101 dBm, m = 30%, Δf = 100 kHz	 ≥70 dB
Local oscillator reradiation at antenna connector	≤–90 dBm
Squelch	
(S+N)/N setting range	6 dB to 20 dB
Squelch hysteresis	1.5 dB to 6 dB
Squelch attenuation (muting) (AF output with activated squelch threshold)	≤–70 dBm
AF outputs (voice) (valid for A3E and F3E in plain and fixed-frequency mode)	
Line output Impedance Level with input signal –47 dBm, f_m = 1 kHz, m = 0.6 or Δf = 3.5 kHz	 600 Ω ±10% 0 dBm nominal (–20 dBm to +10 dBm settable) into 600 Ω, balanced (floating) allowing external grounding; 500 V minimum isolation against ground
AF response With 25 kHz channel spacing and input signal –47 dBm, m = 0.3 With 8.33 kHz channel spacing and input signal –47 dBm, m = 0.3	 300 Hz to 3500 Hz with ±2 dB ≤150 Hz with ≤–15 dB (f_{ref} = 1 kHz) ≥5000 Hz with ≤–20 dB (f_{ref} = 1 kHz) 300 Hz to 3000 Hz with ±2 dB ≤150 Hz with ≤–15 dB (f_{ref} = 1 kHz) ≥4000 Hz with ≤–20 dB (f_{ref} = 1 kHz)
THD (total harmonic distortion) (with input signal –79 dBm to +3 dBm, f_m = 1 kHz and 600 Ω termination) With m = 0.6 With m = 0.9	 ≤5% ≤10%
Noise peak limiter threshold range	m = 0.3 to 0.9 adjustable
AF AGC with input variation m = 0.3 to 0.9	≤1 dB AF output variation

AF outputs (WB) (valid for A9E and F9E in plain and fixed-frequency mode)	
Line output Impedance Level with input signal –47 dBm, f_m = 1 kHz, m = 0.9 or ±6.25 kHz FM deviation	 600 Ω ±10% 1.4 V peak-peak nominal (1 V to 8 V peak-peak settable) into 600 Ω unbalanced
AF response With input signal –47 dBm, m = 0.9 Extended frequency range on request	 30 Hz to 12000 Hz with ±2 dB 25000 Hz with ≤–10 dB (f_{ref} = 1 kHz) 30 Hz to 16000 Hz with ±2 dB
THD (with input signal –79 dBm to +3 dBm, m = 0.9, f_m = 1 kHz and 600 Ω termination)	≤10%
AF outputs (data) (valid for ASK and FSK/MSK)	
Data rate	max. 32 kbit/s, higher data rates on request 16 kbit/s baseband or diphase m = 0.9; ΔF = ±6.25 kHz
RF AGC	
With modulated input signals AM (m = 0.6) or FM (±4.66 kHz deviation) –107 dBm to +1 dBm (LN mode) or –101 dBm to +7 dBm (LD mode) For values with guard receiver installed, see page 9.	≤3 dB AF output variation

Transmitter data

Unless stated otherwise, specs refer to the antenna terminal and involve an antenna impedance of 50 Ω (max. VSWR = 1.1 and nominal power supply).

Output power	
AM carrier power	30 W nominal, 1 W to 30 W adjustable
FM/FSK	100 W nominal, 1 W to 100 W adjustable
Power setting	quasi-continuously and independently for AM and FM
Power reduction for VSWR ≤2 for VSWR >2 for 26 V (FM)/28 V (AM) to 19 V DC	 ≤1 dB graceful degradation graceful degradation from nominal power
Permissible mismatch without damage	short circuit to open circuit, all phases
Duty cycle	continuous transmission
Thermal protection	integrated temperature-controlled fans
Unwanted emissions	
Harmonics suppression	VHF (108 MHz to 173.975 MHz) UHF (225 MHz to 399.975 MHz): ≥80 dB for 2nd harmonics ≥65 dB for 2nd harmonics ≥80 dB for 3rd harmonics and higher
Nonharmonic spurious suppression (for >100 kHz from carrier frequency)	≥80 dBc, 90 dBc typ.
Phase noise attenuation at Δf = ±25 kHz from carrier at Δf = ±1% from carrier at Δf = >±10 MHz	 ≥120 dBc (1 Hz) (VHF)/ ≥110 dBc (1 Hz) (UHF) ≥150 dBc (1 Hz) 165 dBc (1 Hz)
AM modulation depth tolerance with specified input level at AF inputs	80% to 98%
FM frequency deviation Voice WB/data	configurable acc. to the mode used; examples 3.5 kHz 6.25 kHz
AF inputs (NB voice) (valid for A3E and F3E in plain and fixed-frequency mode)	
Nominal input level voice audio	0 dBm
AF line input voice	–15 dBm to +10 dBm settable, into 600 Ω ±10% balanced; transformers with center tap for phantom circuit; 500 V minimum isolation against ground
AF response With 25 kHz channel spacing and nominal input signal With 8.33 kHz channel spacing and nominal input signal	 300 Hz to 3500 Hz with ±2 dB ≤100 Hz with ≤–20 dB (f_{ref} = 1 kHz) ≥5000 Hz with ≤–25 dB (f_{ref} = 1 kHz) 300 Hz to 2500 Hz with ±2 dB ≤100 Hz with ≤–20 dB (f_{ref} = 1 kHz) ≥3200 Hz with ≤–25 dB (f_{ref} = 1 kHz)
AF inputs (WB)	
Nominal input level wideband	1.4 V peak-peak
AF line input WB/data	1 V to 8 V peak-peak adjustable, into 600 Ω ±10%
AF response (valid for A9E) With nominal input signal Extended frequency range on request	 30 Hz to 12000 Hz with ±2 dB 30 Hz to 16000 Hz with ±2 dB
AF response (valid for F9E) With nominal input signal Extended frequency range on request	 300 Hz to 12000 Hz with ±2 dB 300 Hz to 16000 Hz with ±2 dB
AF inputs (data) (valid for ASK and FSK/MSK)	
Data rate	max. 32 kbit/s, higher data rates on request 16 kbit/s baseband or diphase m = 0.9; ΔF = ±6.25 kHz
Distortion AM/FM (with 0 dBm input (300 Hz to 3500 Hz))	≤8%
ALC (automatic level control) function selectable Modulation depth variation for ±15 dB, with input level setting –15 dBm to 0 dBm	 m = 0.8 to 0.98
Noise modulation (S+N/N) (m = 0.9, 1 kHz; f_m = 5 kHz)	≥40 dB
Special tones and PTT	
Test tone	1 kHz/m = 0.9; generator included as standard; for local and remote tests
Sidetone (in plain AM/FM (normal voice) mode, level related to adjusted RX output)	sidetone derived from carrier (AM) or power monitor (FM) and introduced into normal AF output 0 dB to 10 dB adjustable
PTT signalling	variety of methods (configurable): parallel (ground or voltage), serial or via audio inband tone (e.g. 2040 Hz) on request

Built-in interfaces

Serial interfaces	2 serial interfaces up to 115 kbit/s; one RS-232-C, the other one can be configured as RS-232-C/RS-422/RS-485, parameters adjustable for radio control, configuration, user data (SECOS mode with DPP)
LAN	2 interfaces acc. to Ethernet IEEE 802.3, RJ-45 connectors, 10baseT; for radio control, configuration and software download
RF power amplifier (PA) and RF filter control interfaces	2 user-configurable interfaces for Rohde&Schwarz PA and filters: 2 x PA or 2 x filter or 1 x filter + 1 x PA; others on request
RF connectors for antennas	N female for TX or common TX/RX antenna and BNC female for RX
AF standard interfaces	2 narrowband, 2 wideband; for voice and user data
External reference frequency	for special applications; input/output (BNC connector): 0.8/1/2/5 or 10 MHz configurable, can be daisy-chained
Timing system	input/output to receive/transmit TOD (time of day) from/to external timing system (e.g. R&S GT400) acc. to STANAG 4246, STANAG 4430, ICD-GPS-060
Key distribution device interface (fill gun)	KYK-13, KOI-18, DTD (data transfer device) conforming to DS100/DS101/DS102; Rohde&Schwarz KDD (key distribution device); external maintenance tool
External crypto devices	KY 58, KY 57 (others on request)
Miscellaneous interfaces	e.g. PTT, carrier SQ, NOGO, INHIBIT, switched DC for external devices; other I/Os on request
Headphones output	max. 1 V at 150 Ω (adjustable to lower values down to 0 V), NF7-type headset connector
Integrated loudspeaker	max. 0.4 W, volume adjustable via knob
Microphone inputs	dynamic micro: 0 mV to 25 mV into 150 Ω amplifier micro: 0 V to 1 V/150 Ω, 15 mA to 20 mA, 9 V DC max., NF7-type headset connector

General data

Operating temperature range	–20 °C to +55 °C
Storage temperature range	–40 °C to +70 °C
Humidity	≤95% at +55 °C to MIL-STD-810F method 507.2 and DIN EN 60068-2-30, +25 °C /+55 °C
Dust and water protection Control unit Radio	 IP 54 IP 20, upgradeable to IP 32, for radio front only
Fungus	protected to MIL-STD-810C method 508.2
Permissible altitude Permanent operation 5 min operation Transport	 5000 m asl 10000 m asl 10000 m asl
Vibration	5 Hz to 55 Hz, 0.4 mm double amplitude, test period: 30 min to DIN EN 60068-2-6, MIL-STD-167-1 type 1, STANAG 4138
Shock	45 Hz to 2000 Hz, ≤40 g, 3 shocks in two of three axes to DIN EN 60068-2-27, MIL-STD-810D method 516.3
EMI/EMC	EN 301489 MIL-STD-461E: CE101, CE102, CE106, CS101, CS114, RE102, RS101 (maximally achieved test field strength 160 dBpT), RS-103 (2 MHz to 1 GHz, test field strength 10 V/m)
Transients and spikes (AC supply)	STANAG 1008 edition 8 and MIL-STD-1399 sec.103 type 1
Electrical safety	Directive 72/23/EEC (CE mark), IEC 950, VDE 0804, VDE 0805, VDE 0866, EN 60950
Cooling	sensor-controlled forced-air cooling by integrated fans, air flow direction from front to rear side; if there is a front door, it should have sufficient air inlets
Power supply	
DC operation	28 V nominal, 19 V to 31 V with some degradations (acc. to Directives 89/336/EEC and 72/23/EEC)
AC operation Receiver Transmitter, transceiver	 90 V to 264 V, 47 Hz to 63 Hz 90 V to 264 V, 47 Hz to 63 Hz; 110 V at 400 Hz to 440 Hz (with external R&S IN4000A)
AC/DC operation	automatic switchover; priority to AC
Power consumption	depending on configuration and DC/AC supply
(example: VHF/UHF transceiver with CCP, EPM, guard RX)	approx. 80 W (receive mode, DC) approx. 380 W/505 VA for VHF/UHF 30 W AM/100 W FM (transmit mode, AC/DC)
Dimensions	
Transceiver/transmitter (DC)	19" plug-in, 3 HU
Transceiver/transmitter set (AC/DC)	19" plug-in, 3 HU + 1 HU (AC power supply)
Receiver/multiple receiver (AC/DC)	19" plug-in, 3 HU
Additional space for rear cabling	200 mm recommended
Weight	
Receiver	approx. 14 kg
Transceiver	approx. 16.5 kg
EPM transceiver incl. guard receiver	approx.17.5 kg
External Universal Power Supply R&S IN4000A	5.7 kg
Logistics	
MTTR on module level	15 min typ.

Important note: All adjustments, settings and configurations stated above can be performed locally or remotely via software.

Plug-in option

Guard Receiver R&S ET4400G

Guard (distress) frequencies	121.5 MHz and 243 MHz in parallel at the same time
Input signal protection	≤+21 dBm
Sensitivity (with AM (m = 0.3), 121.5/243 MHz) ITU-T S+N/N = 10 dB	≤–101 dBm
Image and spurious rejection	80 dB
Selectivity (IF bandwidth)	≥30 kHz/6 dB, ≤75 kHz/60 dB
AM internal noise level (with input signal –47 dBm, f_m = 1 kHz, m = 0.8)	(S+N)/N = 40 dB (modulated-to-unmodulated), weighted to ITU-T

Certified Environmental System
ISO 14001
REG. NO 1954

Certified Quality System
ISO 9001
DQS REG. NO 1954

Ordering information

Order designation	Type	Order No.
Basic radio		
R&S M3SR Basic Unit Hardware for split-site receiver radios, without CCP, without software, AC/DC	R&S MR4400E	6057.8496.02
R&S M3SR Basic Unit Hardware for split-site transmitter radios; without CCP, without software, DC	R&S MR4400S	6057.8544.02
R&S M3SR Basic Unit Hardware for transceiver radios, without CCP, without software, DC	R&S MR4400X	6057.8596.02
Options		
Frequency range VHF, 108 MHz to 174 MHz	R&S FR4400U	6057.8644.02
Frequency range UHF, 225 MHz to 400 MHz	R&S FR4400D	6057.8696.02
Frequency range VHF/UHF, 100 MHz to 512 MHz	R&S FR4400T	6057.8744.02
Recommended extras		
VHF/UHF Guard Receiver, optional module for R&S M3SR, 121.5 MHz and 243 MHz[1)]	R&S ET4400G	6102.8508.02
Optional Software for fixed frequency and Link 11 operation for R&S M3SR[1)]	R&S DS4400A	6102.2000.13
R&S M3SR Antenna Interface for separate receive and transmit antennas[1)]	R&S GI4403	6103.4758.02
R&S M3SR Antenna Interface for separate guard RX and combined RX/TX antennas[1)]	R&S GI4403	6103.4758.03
R&S M3SR Antenna Interface for separate guard RX, main RX and TX antennas[1)]	R&S GI4403	6103.4758.04
Local Comfort Control Panel (CCP)	R&S GB4000C	6105.6006.02
Protection Processor Module for EPM operation	R&S GP4400	6102.9504.03
Frequency Agile Filter Module for R&S M3SR	R&S FD4430	6103.2003.02
SECOS Waveform Software for voice operation	R&S GS4400	6057.8796.02
SECOS DPP Waveform Software for voice operation (voice + data)	R&S GS4400	6057.8796.03
SECOS Waveform Software for voice operation (voice + data + TDMA)	R&S GS4400	on request
HAVE QUICK I Waveform Software for voice operation	R&S GS4400	on request
HAVE QUICK II Waveform Software for voice operation	R&S GS4400	6057.8796.05
SATURN Waveform Software for voice operation	R&S GS4400	6057.8796.06
Interface Card for UHF DAMA operation with external modem	R&S GI4402	on request
Packages for later upgrade to SECOS, HAVE QUICK I/II, SATURN, etc, on request.		

Ordering example:

The customer wishes to purchase an R&S M3SR that includes:
– transceiver
– for the VHF/UHF range (100 MHz to 512 MHz)
– with Link 11 function and HAVE QUICK II.

The following components need to be selected:

Order designation	Type	Order No.	Add item
Basic radio			
...			
R&S M3SR Basic Unit for transceiver radios, without CCP, without software, DC	R&S MR 4400X	6057.8596.02	✓
Options			
...			
Frequency range VHF/UHF, 100 MHz to 512 MHz	R&S FR 4400T	6057.8744.02	✓
Recommended extras			
...			
Optional Software for fixed frequency and Link 11 operation for R&S M3SR	R&S DS 4400A	6102.2000.13	✓
...			
Protection Processor Module for EPM operation	R&S GP 4400	6102.9504.03	✓
...			
HAVE QUICK II Waveform Software for voice operation	R&S GS 4400	6057.8796.05	✓

...

For the correct order number and type of your equipment, please contact your Rohde & Schwarz representative.

Correct order number:
6102.0607.13
for product
R&S XT 4460J

Auxiliary equipment

Power supply		
Universal Power Supply (external AC)	R&S IN4000A	6105.5500.03
Power supply cable R&S M3SR-R&S IN4000A, 1 m		6105.5639.10
Compatible remote control units		
Comfort Control Unit (DC)	R&S GB4000C	6105.6006.03
Comfort Control Unit (AC/DC) (suitable for all radio types, incl. software)	R&S GB4000C	on request
Remote Control Units of R&S Series 400U[2]	R&S GB406xx	on request
Audio accessories		
Handset, rugged type	R&S GA013	0693.7712.02
Headset, standard type	R&S GA015	0583.6012.02
Headset, light type	R&S GA015L	6082.9663.02
Headset, rugged type	R&S GA012	0693.7664.02
Microphone, dynamic, handheld type	R&S GA016H1	0583.5568.02
External filters and amplifiers		
All Rohde&Schwarz filters and amplifiers in the radio frequency range are suitable. They can be remote-controlled via the basic radio.		
Mating connectors (suitable for all radio types)		
Full Connector Set	R&S ZF4410	6105.9011.02
Connector Set without circular connector	R&S ZF4410	6105.9011.03
Antennas		
VHF (100 MHz to 163 MHz)	R&S HK012	0459.7611.02
UHF (225 MHz to 400 MHz)	R&S HK001	0425.2781.03
VHF/UHF (100 MHz to 1300 MHz)	R&S HK014	0644.1514.02
Miscellaneous		
VHF/UHF Diplexer (100 MHz to 163 MHz/ 225 MHz to 400 MHz)	R&S FT224	0525.5117.03
Rohde&Schwarz Timing System[3]	R&S GT400	on request

1) Also available as upgrade kit.
2) With R&S GB406xx, only the operational remote-control functions of R&S M3SR are available. Please ask for special firmware to control R&S M3SR.
3) Recommended for time synchronization of frequency hopping systems, including GPS receiver and disciplined rubidium oscillator.

PD 0757.6691.22 · Digital Reprogrammable Software Radios R&S M3SR · Trade names are trademarks of the owners · Subject to change · Data without tolerances: typical values
Printed in Germany 0203 (Bi sk)

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A2. V.24 Remote Control (S400U Protocol)

A2.1 General

Via interface X24 (RS 485 / RS 232) the M3SR Transceiver can be remote-controlled by means of a personal computer and/or for example the following control units:

- ❑ GB 406C1 (only fixed frequency and voice)
- ❑ GB 406C2 (only fixed frequency and voice)

A2.2 Frame for Data Traffic

Each data transmission is started with "Line Feed" (lf) and ended with "Carriage Return" (cr).

Several commands up to a total length of 100 characters may be stringed together. Any characters exceeding this will be ignored. The response of the interface always starts with a line feed.

A2.3 Address

Each data transmission contains an address.

Address format for commands: Axx

Address format for responses: axx

A2.4 Acknowledgement

The acknowledgement contains, in addition to the frame with "lf" and "cr", the address and a character signalling the following information:

- ? = reception of a corrupted character (e.g. wrong parity, length or similar)
- * = command not permitted, false parameter etc.
- E = local operation (all inquiries / commands are responded to with "axxE" only)
- U = command correctly understood

The priority is governed by this sequence.

A2.5 Addressing

A2.5.1 Addressing Range

Addresses 01 to 99 are the generally used device addresses.

The following is valid if Tx operation is separated from Rx operation (Split Site):

Rx addressing range: 01 to 49

Tx addressing range: 50 to 99

Tx address = (associated Rx) + 50

A2.5.2 Characteristics of Data Transmission

Transmission is carried out asynchronously in ISO-7-bit code and with odd parity (with 300 Baud even parity). Characters with wrong parity and faulty ones will be ignored.

Baud rates between 300 and 115 200 baud are accepted.

A2.6 Inquiry

A2.6.1 Format of Responses

This format corresponds to that of the acknowledgements. Thus the same characters are contained (E, U) in addition to the frame, the address and the information required. The waiting period until the end of response depends on the kind of command and varies from approximately 100 ms up to 5 s.

A2.6.2 Inquiry of Carrier and Squelch

The control code for this inquiry is "N". This inquiry is recommended for general polling of changes concerning the test message and the setting.

A2.6.3 Inquiry of Frequency or Channel Number

The control code for this inquiry is "O2". Either the channel number or the frequency can be inquired, but not the channel / frequency assignment. This inquiry is recommended in order to trace the scanning.

A2.6.4 Inquiry of Entire Setting

The control code for this inquiry is "O3". The following information is reported:

- ❑ Radio characteristics
- ❑ Frequency or channel
- ❑ Mode of operation
- ❑ Communication mode
- ❑ Class of emission
- ❑ Guard receiver on / off
- ❑ Power stage
- ❑ Squelch on / off
- ❑ Scanning mode (only if set)

This inquiry should be performed about 1 s after all setting commands in order to check if the command was executed successfully.

A2.7 Scanning (S400U only)

The control code is "Q" with two 2-digit channel numbers defining start and end channels.

The scanning mode is left by entering a new frequency or channel number.

If in scanning a channel (= preset stored in radio) is hit where reception is taking place, scanning will stop until a new scanning command is received.

A2.8 Test Messages

The control code for the inquiry of test messages is "O1". If there are several test messages, all of them are contained in the radio answer.

A2.8.1 Connectives

The messages "VSWR > 2" (T4) and "No carrier" (T5) are linked with PTT and stored.

A2.8.2 Change Report

Any alterations of test messages or status messages (S400U only) will be transmitted immediately after the next inquiry.

A2.9 Remote-control Codes

Command	Function	Code	Direction	Note
EPM modes	Plain (not encrypted) Cipher ext. (encrypted)	B0 B7	CU → radio	
Presets	Preset (stored in remote CU) xx = 00 to 99 e.g. no. 05: C005F305000L1	C0xx	CU → radio	S400U only
Channel loading	Loading of frequencies into channel xx = 00 to 99 (= preset stored in radio)	C6xxFxxxxxx[x]	CU → radio	S400U only
Operation	Voice Data B0: wideband analog Link 11 Link 4a B0: wideband digital baseband B0: wideband digital diphase	D0 D1 D1 D4 D5 D6 D7	CU → radio	 S400U only S4400 only t.b.r.l.
Local mode	Operation via local CU (E instead of U at the end of message) All commands and inquiries are answered with "axxE" only.	E	radio → CU	 S4400 only
Frequency				see A2.11
	VHF + UHF 100.000 to 511.975 MHz (25-kHz spacing) 100.000.0 to 511.991.6 MHz (8.33-kHz spacing)	Fxxxxxx[x]	CU → radio	S4400 only
	VHF 100.000 to 162.975 MHz (25-kHz spacing) 100.000.0 to 162.991.6 MHz (8.33-kHz spacing)			S400U only
	UHF 225.000 to 399.975 MHz (25-kHz spacing) 225.000.0 to 399.991.6 MHz (8.33-kHz spacing)			S400U only
Guard receiver	Off On	G0 G1	CU → radio	
Class of emission	AM FM	I1 I7	CU → radio	
Channel	Select channel (= preset stored in radio) xx = 00 to 99	Kxx	CU → radio	
Frequency modes	Manual e.g. FxxxxxxL0	L0	CU → radio	
	Preset e.g. C0xxFxxxxxxL1 (= preset stored in CU) e.g. KxxL1 (= preset stored in radio) e.g. QxxxxL1	L1		 S400U only S400U only
	Guard (includes voice "B0D0" with AM "I1") e.g. F243000L2 (UHF guard frequency)	L2		
	Maritime (e.g. KxxL3)	L3		n/a

Command	Function	Code	Direction	Note
Inquiry	Carrier and squelch reports recommended time-out for inquiry "N" 1.2 s, for all other inquiries and commands 5 s (9 600 Bd)	N	CU → radio	
Inquiries	Version and date of radio software (response Vx.xxdd.mm.yy) Test message (response T0 to Txx) Channel or frequency (response Kxx or Fxxxxx) Entire setting parameters (response Pxyz[Cxxx*][Fxxxxxx][Kxx]Lx [Qxxyy*]BxDxGxIxSxVx[Wx**] Status of HDX setup [ ] = available according to selected mode * = S400U only ** = valid in anti-jam mode only	O0 O1 O2 O3 O5	CU → radio	S400U only S400U only
Radio types	Frequency range x=1: VHF X=2: UHF X=3: VHF/UHF X=5 to 7 Equipment type y=1 to 4 y=5: Rx y=6: Tx y=7: Rx/Tx y=8: split site	Pxyz	radio → CU	 S400U only S400U only
Scanning	Scanning between channels xx and yy xx = 00 to 98 yy = 01 to 99 Switched off by frequency (FxxxxxxL0) or channel (KxxL1) command	Qxxyy	CU → radio	S400U only
Radio modes	Radio off Radio on (low power) Radio on (medium power) Radio on (high power)	S0 S1 S3 S5	CU → radio	S4400: S0 is effective for Tx only
Test messages (CBIT)	Radio Go Radio NoGo in local operation Highamp NoGo Amp NoGo VSWR > 2 Carrier NoGo Blower on Supply voltage out of range Local CU NoGo Tx/Rx switch NoGo PP NoGo DC NoGo AC NoGo IF NoGo Synth NoGo Option 2 NoGo GRx NoGo Link 11 / 4A NoGo Option 1 NoGo RF NoGo Overtemperature Audio IF NoGo FPGA NoGo Battery low DAMA NoGo	T0 T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T40 T41 T42 T43 T44 T45 T46 T47 T48 T49 T50 T51 T52 T53	radio → CU	 S400U only S400U only S400U only S400U only S4400 only S4400 only S4400 only t.b.r.l.

Command	Function	Code	Direction	Note
	Radio warning messages Same problem as Ty/Tyy, but meaning is only "Warning" instead of "NoGo".	T1yy		
Positive acknowl-edgement	Response if command is free from syntax errors (= "*" instead of "U") or bit errors (e.g. parity = "?" instead of "U") "!" instead of "U"	U	radio → CU	 S400U only
AF control	Squelch off Squelch on	V0 V1	CU → radio	
IF band-width	Narrowband Wideband	W0 W1	CU → radio	S400U only S400U only
Carrier / squelch reports	No carrier and no squelch Squelch - Rx Squelch - GRx Squelch - Rx and GRx Carrier Carrier and squelch - Rx Carrier and squelch - GRx Carrier and squelch - Rx and GRx	X0 X1 X2 X3 X4 X5 X6 X7	radio → CU	
PTT control	PTT off PTT (timeout 1 s) PTT with tone (timeout 1 s) PTT enabled PTT inhibited Tone without PTT	Y0 Y1 Y2 Y3 Y4 Y5	CU → radio	 S400U only S400U only S400U only S400U only
Userbits output	f = hex number from 0 to f	Zff	CU → radio	t.b.r.l.

A2.10 Examples

(e.g. address 01)

Command	Code →	Code ←	Meaning
Inquiry	lfA01Ncr	lfa01X0Ucr	SQL / carrier off
Inquiry	lfA01O1cr	lfa01T0Ucr	No failure
Inquiry	lfA01O2cr	lfa01F300000Ucr	Current frequency
Inquiry	lfA01O3cr	lfa01P371F300000L0B0D0G0I1S1V1W0Ucr	Overall status
Transmitter on	lfA01S1O1cr	lfa01T0Ucr	No failure (low power)
Frequency	lfA01F300000L0O3cr	lfa01Ecr	Local operation
Frequency	lfA01F30000L0cr	lfa01*cr	Impermissible value (30 MHz)
Frequency (8.33-kHz spacing)	lfA01F1234500L0cr (e.g. 123.4500 MHz)	lfa01Ucr	7 numbers instead of 6: 8.33-kHz spacing or 25 / 12.5-kHz spacing with offset
Channel 00	lfA01K00L1cr	lfa01Ucr	Correctly understood
Guard receiver on	lfA01G1O3cr	lfa01P371F300000L0B0D0G0I1S1V1W0Ucr	GRx not installed (answer: G0 !)
Scanning	lfA01Q0108L1O3Ncr	lfa01P371K01L1Q0108B0D0G0I1S1V1W0X0Ucr	Correctly understood (S400U only)
Inquiry during scanning	lfA01O2cr lfA01O2cr : lfA01O2cr	lfa01K02Ucr lfa01K03Ucr : lfa01K07X1Ucr	Scanning operation (S400U only) Scanning stop at channel 7 due to reception (recommended inquiry rate 1/s)
Transmitter off	lfA01S0O3cr	lfa01P372F300000L0B0D0G0I1S0V1W0Ucr	Correctly understood
Inquiry of alteration	lfA01Ncr	lfa01X1cr	SQL main receiver (recommended inquiry rate 1/s)
Inquiry of alteration	lfA01Ncr	lfa01X0T07Ucr	Occurence of NoGo message: Operating voltage out of range (radio attaches message Txx altough not inquired)

A2.11 Rules for Remote Frequency Control of Series M3SR

A2.11.1 Input of 6 Digits: (25 / 12.5-kHz Spacing without Offset)

Format: FFFFXX (XX = 00 / 12 / 25 / 37 / 50 / 62 / 75 / 87)

A2.11.2 Input of 7 Digits: (25 / 12.5-kHz Spacing with Offset or 8.33-kHz Spacing)

a) Offset

Format: FFFFXXO (XX = 00 / 12 / 25 / 37 / 50 / 62 / 75 / 87)

O = 1: -2.5 kHz
O = 2: +2.5 kHz
O = 4: -5 kHz
O = 5: +5 kHz
O = 7: -7.5 kHz
O = 8: +7.5 kHz

b) 8.33-kHz spacing

Format: FFFFXXX (XXX = 000 / 083 / 166 / 250 / 333 / 416 / 500 / 583 / 666 / 750 / 833 / 916)

A2.11.3 Frequency Table

(e.g. 118.000 MHz to 118.100 MHz)

Frequency (MHz)	Spacing / BW / Offset (kHz)	Command
118.000.0	8.33 / NB / - 12.5 / WB / 0 12.5 / WB / +2.5 12.5 / WB / +5.0 12.5 / WB / +7.5	1180000 118000 1180002 1180005 1180008
118.000.3	8.33 / NB / -	11800083
118.012.5	12.5 / WB / 0 12.5 / WB / -2.5 12.5 / WB / +2.5 12.5 / WB / -5.0 12.5 / WB / +5.0 12.5 / WB / -7.5 12.5 / WB / +7.5	118012 1180121 1180122 1180124 1180125 1180127 1180128
118.016.6	8.33 / NB / -	1180166
118.025.0	8.33 / NB / - 12.5 / WB / 0 12.5 / WB / -2.5 12.5 / WB / +2.5 12.5 / WB / -5.0 12.5 / WB / +5.0 12.5 / WB / -7.5 12.5 / WB / +7.5	1180250 118025 1180251 1180252 1180254 1180255 1180257 1180258
118.033.3	8.33 / NB / -	1180333
118.037.5	12.5 / WB / 0 12.5 / WB / -2.5 12.5 / WB / +2.5 12.5 / WB / -5.0 12.5 / WB / +5.0 12.5 / WB / -7.5 12.5 / WB / +7.5	118037 1180371 1180372 1180374 1180375 1180377 1180378
118.041.6	8.33 / NB / -	1180416
118.050.0	8.33 / NB / - 12.5 / WB / 0 12.5 / WB / -2.5 12.5 / WB / +2.5 12.5 / WB / -5.0 12.5 / WB / +5.0 12.5 / WB / -7.5 12.5 / WB / +7.5	1180500 118050 1180501 1180502 1180504 1180505 1180507 1180508
118.058.3	8.33 / NB / -	1180583
118.062.5	2.5 / WB / 0 12.5 / WB / -2.5 12.5 / WB / +2.5 12.5 / WB / -5.0 12.5 / WB / +5.0 12.5 / WB / -7.5 12.5 / WB / +7.5	118062 1180621 1180622 1180624 1180625 1180627 1180628
118.066.6	8.33 / NB / -	1180666

Frequency (MHz)	Spacing / BW / Offset (kHz)	Command
118.075.0	8.33 / NB / -	1180750
	12.5 / WB / 0	118075
	12.5 / WB / -2.5	1180751
	12.5 / WB / +2.5	1180752
	12.5 / WB / -5.0	1180754
	12.5 / WB / +5.0	1180755
	12.5 / WB / -7.5	1180757
	12.5 / WB / +7.5	1180758
118.083.3	8.33 / NB / -	1180833
118.087.5	12.5 / WB / 0	118087
	12.5 / WB / -2.5	1180871
	12.5 / WB / +2.5	1180872
	12.5 / WB / -5.0	1180874
	12.5 / WB / +5.0	1180875
	12.5 / WB / -7.5	1180877
	12.5 / WB / +7.5	1180878
118.091.6	8.33 / NB / -	1180916
118.100.0	12.5 / WB / 0	118100
	12.5 / WB / -2.5	1181001
	12.5 / WB / -5.0	1181004
	12.5 / WB / -7.5	1181007

A2.11.4 ICAO Frequency Table

(e.g. 118.000 MHz to 118.100 MHz)

ICAO Frequency (MHz)	Spacing (kHz)	Command
118.000	25	118000
118.005	8.33	1180000
118.010	8.33	1180083
118.015	8.33	1180166
118.025	25	118025
118.030	8.33	1180250
118.035	8.33	1180333
118.040	8.33	1180416
118.050	25	118050
118.055	8.33	1180500
118.060	8.33	1180583
118.065	8.33	1180666
118.075	25	118075
118.080	8.33	1180750
118.085	8.33	1180833
118.090	8.33	1180916
118.100	25	118100

A3. LAN / V.24 Remote Control (GB2PP Protocol)

A3.1 General

More detailed information is provided by the Serial Interface Control Document, available on demand from Rohde & Schwarz at extra charge (order no.: 6102.3258.00).

A3.2 List of Commands

The following lists contains possible commands. It does not claim to be complete.

A3.2.1 Primary Commands

AL	ALE
AS	ALIS
DL	Download
DM	DAMA
ER	Errors
EX	External interfaces
FF	Fixed frequency
GR	General radio functionality
GX	Guard receiver
HQ	Have Quick
HW	Hardware interface
MH	MIB handling
OP	Options
PP	Preset Page control
RA	Selection between two radios (with M3SR the radio selection parameter in the MIB path is left out, default = RA)
RB	With M3TR for multi-combined radios
RC	Radio control
SC	Session control
SE	SECOS
SH	SECOM-H
ST	SATURN
SV	SECOM-V
UA	User access

A3.2.2 Secondary Commands

AC	Set and request the current communication mode of the radio
AD	Define and request the current address definition list of the radio
AF	Set and request the configuration parameters of the AFI
AG	Set and request the current AF AGC status
AM	Set and request the audio mapping between audio and Comline
AP	Set and request the active control port
AS	Set and request the order of audio output at the radio front panel
AS	Start / stop scan mode
AT	Set all trap-commands to off
CC	Request the current capabilities of the Comlines
CD	Request the detail of one entry in the CBIT list
CL	Clear the complete error list of the radio
CL	Set and request the clipper status for the receiver module
CO	Set and request the current communication mode
CP	Change stored PIN number
CP	Set and request the current parameter page
CS	Request the status of the last CBIT
CS	Request and trap the current cipher unit status
DM	Request the current data port mode status
DM	Set and request the device mapping between an external device and the radio
DM	Set and request the default communication mode of the radio
DO	Delete an activated radio option
DP	Disable activated user PIN
DP	Delete one or a range of Preset Pages
DS	Set all radio settings to default values
DS	Set and request the default Tx power switch
ED	Request the error detail for an error log entry
EE	Request the data of one error log entry
EL	Request the error list with all error log entries
EP	Enable special PIN for a user
ET	Request the current radio elapsed time
FD	Set and request the mapping for full duplex mode
GN	Request the current GO/NOGO status of the radio
GR	Set and request the current guard receiver status
ID	Request the detail of one entry in the IBIT list
IL	Request the inventory list of the radio
IR	Enable / disable Rx
IS	Request the status of the last IBIT
IT	Enable / disable Tx
LD	Set and request the logical address of a local control unit
LI	Set and request the LAN interface parameters
LP	Set and request the parameters of one preset page within the loaded preset
LS	Request a status list of the preset pages stored in the loaded preset

MA	Acknowledge / disacknowledge and request marker tone
MC	Set and request the mapping between slot numbers and Comline for a module
MD	Set and request the current modulation status
ML	Request the available communication modes
MP	Set and request the default MIB path
MT	Enable or disable marker tone for the radio Comline
ND	Request the detail of one entry in the inventory list
OA	Set and request the own address of the radio
OL	Request the radio option list
OP	Activate a new radio option
PA	Set and request the configuration parameters of the VU PA
PD	Send new data to the radio within the Preset key download container
PD	Set and request the current Preset definition
PF	Set and request the current PTT status
PG	Set and request the activated connection control
PL	Set and request the configuration parameters of the radio platform
PM	Set and request the PTT mapping between keylines and Comlines
PP	Set and request the currently selected Preset Page
PS	Set and request the currently selected Preset
PT	Set and request the current PTT tone status
RI	Request the current Rx indicator status
RL	Set and request the radio local status
RP	Restore the selected Preset Page from Loaded Preset to User Preset
RS	Set and request the standby mode status of the radio modules
RS	Request the current RSSI level
RS	Request the current guard RSSI level
RX	Set and request the configuration parameters of the VU RX
SB	Request the current sessions of the connected radio
SC	Request the current capabilities
SD	Send new software to the radio within the software download container
SD	Set and request the definition of the main / standby partners
SI	Start / stop IBIT
SI	Request the current squelch indicator status
SI	Set and request the serial interface parameters
SM	Set and request the current scan mode status
SN	Request the current scan indicator status
SP	Set and request the squelch polarity
SP	Save the parameters of the current preset page
SP	Set and request the channel spacing for fix frequency mode
SQ	Set and request the current squelch status
SQ	Set and request the squelch switch status
SS	Set and request the assignment of a radio's own Comline to a split-site partner's Comline
ST	Set and request a current session on a Comline

SY	Set and request the configuration parameters of the VU SYN
TC	Request the current Tx indicator status
TI	Set and request the radio time
TO	Request the current Tx output power indicator status
TO	Set and request the current Tx offset status
TR	Set and request the current Tx / Rx frequency status
TS	Set and request the Tx power switch status
TV	Request the current Tx VSWR indicator status
TX	Set and request the configuration parameters of the VU TX